CHEMICAL LIBRARY OCT 20 1921

GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. CLVI. No. 3047.] LONDON, OCTOBER 5, 1921. [78rd Year. Price 1s.

OXIDE OF IRON
SPENT OXIDE

GAS PURIFICATION AND CHEMICAL CO., Ltd.
PALMERSTON HOUSE, LONDON, E.C.2.
Telegrams: "PURIFICATION, LONDON."
Telephone: 9144 London Wall.

PUMPING ENGINES
All Types for ACID, &c.
CAST-IRON OR STEEL TANKS
Any Capacity.
CHEMICAL PLANT.
Roofs and Girders. Structural Work.
Air and Gas Compressors.
MIXERS.
TAR STILLS AND CONDENSERS.
SULPHATE OF AMMONIA PLANT
W. NEILL & SON, Ld.
Engineers, Iron & Brass Founders,
ST. HELENS JUNCTION.
Telegrams: 'Neill, St. Helens.' Telephone No. 20.

THE
SILKSTONE MAIN COLLIERY
CO., LTD.,
SILKSTONE COMMON,
Nr. BARNSLEY.
Producers of Gas Coal from
The Silkstone Four Feet Seam
Telephone: 1 SILKSTONE.
Telegrams: "COWCILL SILKSTONE."

"TORBAY PAINT"
FOR ALL PURPOSES.
The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C.
39/41, Old Hall St., LIVERPOOL.

"BLUEBELL"
SILICA RETORTS
(95% SILICA)
John G. Stein & Co., Ltd.,
Castleoary, SCOTLAND.

Makers of
GASHOLDERS,
TANKS (C.I. or Steel),
PURIFIERS,
WASHERS,
ROOFS,
&c.
ASHMORE, BENSON, PEASE & CO., LTD.
STOCKTON-ON-TEES.
Complete GAS WORKS
London Office
81, Victoria Street, Westminster, S.W.
Telegrams: "GASHOLDER."

W. & B. COWAN
(Incorporated in Parkinson and W. & B. Cowan, Ltd.),
LONDON. MANCHESTER. EDINBURGH. GLASGOW.
SYDNEY. MELBOURNE. BRISBANE. WELLINGTON, N.Z.

(See Advertisement on page III. of Wrapper.)

JAMES McKELVIE & CO.
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
59, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL,
NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1840.

STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
TUBES & FITTINGS for Gas, Steam, Water, &c.

See
Important Announcement
by
Radiation
LIMITED
On p. III. of Centre

"RODOR" ELASTIC PAINT
Does not blister or "chalk" off.

The HORSELEY BRIDGE & ENGINEERING Co., LTD.,

TIPTON, STAFFORDSHIRE.

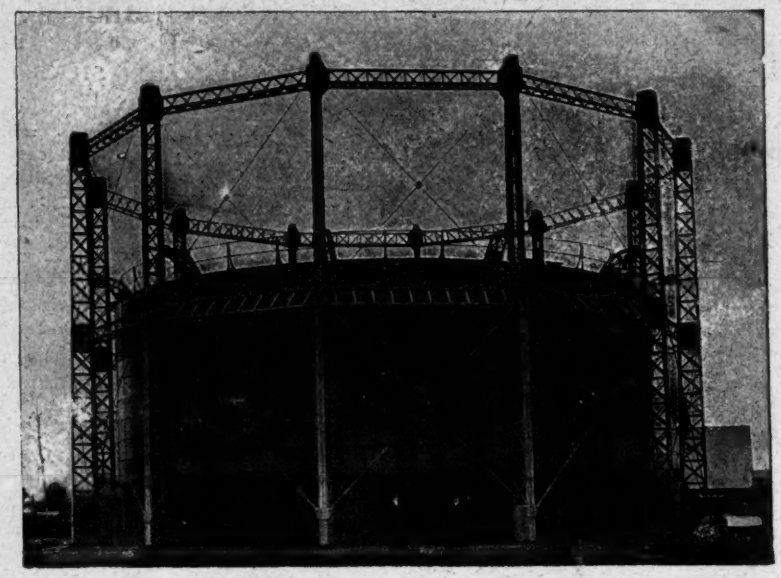
MAKERS — OF — **GASHOLDERS & GAS PLANT.**

PURIFIERS, SCRUBBERS, CONDENSERS, WASHERS, TANKS, VALVES, PIPES, LAMP-PILLARS, RETORT-FITTINGS, CAST-IRON AND STEEL TANKS, PRESSED STEEL FLOORING, Etc.

Works & Head Office:
TIPTON,
STAFFORDSHIRE.

London Office:
11. VICTORIA STREET,
WESTMINSTER.

Telegraphic Addresses:
"HORSELEY, TIPTON."
"GALILEO, LONDON."



Also all Kinds of
STRUCTURAL IRON AND
STEEL WORK.
BRIDGES,
ROOFS,
PIERS, Etc.

B DONKIN D

DONKIN

for

HIGH-PRESSURE GAS PLANTS

ROTARY AND RECIPROCATING COMPRESSORS :: DISTRICT AND SERVICE GOVERNORS :: PATENT DOUBLE FACED VALVES.

THE BRYAN DONKIN COMPANY, LTD.,

Head Offices & Works, **CHESTERFIELD.**

LONDON OFFICE: 3, VICTORIA STREET, WESTMINSTER, S.W. 1.

Chesterfield Telephone No. 84.
London Telephone No. 5358 Victoria.

Chesterfield Telegrams, "Donkin, Chesterfield."
London Telegrams, "Donkin, Vic. London."

B CHESTERFIELD D

GAS JOURNAL

LIGHT ⁂ HEAT ⁂ POWER ⁂ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CLVI., No. 3047.] WEDNESDAY, OCTOBER 5, 1921. [73RD YEAR.

EDITORIAL NOTES.

The Search for an Official Recording Calorimeter.

In last week's issue, the programme was published for the forthcoming meeting of the Institution of Gas Engineers, and editorial reference was made to it. Further comment is not required; but there is one item of the programme which will be regarded as of pre-eminent importance in connection with the change which is taking place in the industry in respect of substituting the therm basis of charging for gas for the method of trading by volume. The Council of the Institution, presumably considering the importance of the subject of recording calorimeters, have given first place in the technical proceedings to the presentation of the Fifth Report of the Gas Investigation Committee, which deals with the matter, and the publication of which commenced in our issue for June 22 [p. 677]. In view of the discussion, we have made inquiry of the Gas Referees as to the position of their investigation which is to result in the prescription of a recording calorimeter for official purposes in accordance with the Gas Regulation Act. The gas industry is anxiously watching for the instrument which will be the official one; but it may at once be said that there is no hope of any immediate prescription, and no indication can be given as to the ultimate recording calorimeter that will receive authorization. The matter is all in the air at present; but better that time should be taken, and the best instrument be secured, than that large expenditure should be incurred in the production and installation of numbers of one which might in some respects be proved to be defective or deficient for the purpose.

The statement we are able to make (through the courtesy of the Gas Referees) as the result of our inquiry regarding their views and policy, has in substance been communicated to most of the gas undertakings in respect of which Orders have already been made under section 1 of the Gas Regulation Act, as well as to the local authorities concerned. The Gas Referees say positively that they are not satisfied at present that any recording calorimeter now on the market is suitable for general prescription for official testings of the gas supplied by undertakings. They wish, however, to emphasize the difference between the conditions and requirements of works testings for the information and guidance of a gas undertaking and of official testings, on the results of which depends the answer to the question whether a gas undertaking has, or has not, fulfilled its obligations to the consumers. Recording calorimeters which answer admirably the former purpose may, in the opinion of the Referees, be unsuitable for giving the exact and conclusive evidence which is essential in the latter case. Moreover, it must not be overlooked that instruments on works will be more or less under constant supervision, while there are testing-stations in the country which may be visited by the official gas examiners (say) only once a week. Reliability is therefore of considerable importance; and time only can prove reliability. Meantime, the Referees are prescribing intermittent testings with the "Boys" non-recording calorimeter. It is quite evident from this that they are making a very thorough research into the available calorimeters under testing-station conditions; and there is no question that they will be prepared to give consideration to any other design that may, in their opinion, be suitable for the purpose in view, providing it is in time to include in the trials in hand. At present the Referees are investigating side by side three types of recording calorimeters which embody certain initial requirements—viz., the Fairweather, the Simmance, and the Thomas, all of which it is hoped will be in action, and open to the inspection of the members of the Institution, at the testing-place at No. 1, Carlyle Square, Chelsea, on the occasion of the annual meeting. This inspection has been rendered possible through the kindness of the Gas Light and Coke Company and the London County Council. It is likely that the trials of these instruments will occupy some months; and, of course, the results of the working experience will guide the Referees in determining whether one or more of these three or further types may be accepted generally for official use. At least one other type of calorimeter (which is still in the constructional stage) will also probably be put on trial shortly in an official testing-place in London for the guidance of the Referees.

The three instruments under trial—the Simmance, the Fairweather, and the Thomas—have been fully described in the "JOURNAL." The Simmance is dealt with extensively in the Fifth Report of the Gas Investigation Committee, as published by us on June 22, *et seq.* The Thomas recorder was noticed in our issue for April 13 last [p. 80]. A description of the Fairweather calorimeter appeared on June 15 [p. 628]. In this article, it was intimated that the Gas Referees had given a limited certification to the Fairweather calorimeter for the official testing of the gas supplied by the Brentford Gas Company, but that the certification was liable to cancellation at the end of the year if the instrument proved unsatisfactory for official purposes. Reverting to the Simmance instrument, we know that it has been on trial for at any rate the past six months in one of the testing-stations in the district of the South Metropolitan Gas Company. Towards the end of the Fifth Report of the Gas Investigation Committee, reference is made to certain improvements that have been effected in the Simmance instrument; and we believe that the instrument installed at Carlyle Square has been improved in certain details upon the one under trial in the South Metropolitan Company's district. Of course, one can well understand that the South Metropolitan gas does not afford a very severe test, because it is extremely uniform in all respects; but where a mixed gas supply is distributed, naturally the fluctuations in composition may be greater, and therefore the claims upon the recording instrument would be more exacting. The companion instruments of the Simmance at Carlyle Square—the Fairweather and the Thomas—have only been installed recently for the purpose of trial by the Referees. It will be noticed that the Beasley recorder has no part in these trials. It may be remembered that, when dealing with this instrument towards the end of the fifth report, the Gas Investigation Committee drew attention to two marked defects which exclude it for adoption as a standard instrument. In it no attempt is made to compensate for changes in atmospheric conditions; and there are no means of checking the record except by a test on an independent water-flow calorimeter. Although the Beasley is not a water-flow calorimeter, it is very useful for works purposes, and in this respect has obtained a good adoption. However, from this article it will be gathered that it may be some months before an official recording instrument is prescribed. The delay should ensure the best being selected; and the "best" may be of more than one type. No one can yet tell.

The Opportunity for Gas-Trading Development.

Stimulating were the proceedings at the tenth annual conference of the British Commercial Gas Association held in Glasgow last week, under the presidency of Mr. D. Milne Watson, M.A., LL.B., and with the hospitable countenance

and hearty support of the governors of the great commercial centre, headed by the Association's old friend, Lord Provost Thomas Paxton. The Association could not have met in any city or town where the welcome would have been, or could have been, more cordial and sincere. This was felt, realized, and appreciated. The atmosphere, too, was vibrant with enthusiasm. There is no lack of it among the members. Ten years of strenuous and successful work by the Association lie behind them; and they know to-day that, helpful in popularizing and educative work as was the organization before the war, the gas undertakings of the country would have been, during the war and since, very much injured without this very effective piece of machinery working to keep their end up amid the stress and buffetings of opposing interests, and the cross currents of diverse influences. And now the members have to look to the future. They have had the fullest attestation that the officials and the Executive of the Association (with Mr. F. W. Goodenough as Chairman) are opportunists of the first water, but opportunists in a good cause. Imagination and inventiveness are there, which have kept the commercial interests of the industry neck and neck with the needs of the day, and have paved the way for the future. What has been will be, while the organization is under present guidance. Ideals and standards of efficiency are always with them somewhat ahead of the attained point; and while this continues, all will be well, subject to adequate support and the supplement of local effort.

The subject-matter prepared for the consideration of the members on this occasion was extensive, and, as one examines it all, it is found in every part of the substance to be reinforcing or illustrative of the philosophic address which the President delivered, and which was printed by us last week, with an addendum in the report of the proceedings published to-day. The address carried us to the past; then diverted thoughts to the present; and, finally, strongly appealed for the utmost being made of current conditions (though some may still be repressive) to stabilize the position of the industry, and to promote future progress. The current commercial opportunities of the industry force themselves on attention from every component of the proceedings. They cannot be avoided by those who heard and those who read, and hearing or reading them understand. Observation and general survey irresistibly force us to the conclusion that there are not a few responsible managers in the industry who do not appraise fully the opportunities of the present. There is a proneness to look too much on the repressive conditions, and obtain guidance in policy from them rather than from those conditions that are full of promise in helpfulness, and that open up the vista to larger service. Repressive conditions must not be allowed to govern. They are there to be actively operated against, so that the utmost use may be made of all that offers to-day in the way of opportunity. There are others who are of opinion that activity in promoting sales of gas can be deferred because, among labour-saving heating agents, gas holds the upper hand in thermal efficiency. The folly of this needs no comment.

The President says, and says rightly, we are at a new starting-point. We are not back to pre-war conditions, nor are other people, nor is anyone likely to be exactly so, though we may get nearer than we are at present. We have to bear these things in mind; and we must not allow other people, with less favourable opportunity, to have a larger outlook to-day than we have ourselves. "D.O.R.A." is dead; and a larger liberty is here. A new light, the President tells us, is also breaking in the labour world; and it is being more widely recognized now in the labour world that production must be the basis of wages, not the cost of living. Further that economic laws must prevail, and not a state of artificiality. Materials and goods are also decreasing in price, and so is money—slowly but surely. The industry is being reinstated in respect of dividends. Its manufacturing operations have been opened-up to fresh opportunity by the freedom conferred by the therm basis of working and charging. The campaign against smoke pollution of the atmosphere has been revived; and scientists and medical men are day by day growing stronger in their condemnation of the use of fuel that creates insanitary conditions of the atmosphere, that helps to obscure natural light and the purifying and health-giving effects of the sun's rays, and that creates dirt and needless labour. Industry has learned during the years of war how vastly a controllable fuel such as gas facilitates the economic progress of its works and factories. In the home (largely through the work of the Association in connection with housing, smoke abatement, and educational propaganda), the labour-saving conveniences, the comfort, the prompt responsiveness of gas to need, and its ability to carry light where darkness previously prevailed, constitute growing knowledge. This is an opportunity—substantial and vast. Opportunity is at high-water mark; and the one dam of cost must not, viewing the future and the competition, be allowed to intercept the flow of new business. In the initial stages of revival in application of proved sound business principles and methods, the cost is bound to be, after the great chaos, higher than pre-war cost per unit of new business; but it will be a diminishing quantity, though we do not look yet for a descent to the pre-war level.

Some remarkable testimony as to commercial progress was given in the Presidential Address and in the papers. The President stated that it has been ascertained that gas is used by no less than 4000 different branches of trade and industry, with resultant economy, increased convenience, and improved quantity and quality of output. Mr. Samuel Milne and Mr. George Keillor also gave notable testimony as to the industrial uses of gas; while Mr. J. W. M'Lusky supplied equally satisfactory evidence as to the advance that is being made by gas in domestic service, and incidentally the figures he gave showed the large extent of adoption of gas-fires by the medical profession. Dr. J. S. Owens, viewing the work and information available to-day—information such as was furnished not only by himself but by Dr. Saleeby—gave it as his decided opinion that the time is undoubtedly near when it will be regarded as an offence against public health to pollute the air in the same sense as it is now an offence to pollute drinking water. When the community realize that they are consuming polluted air, they will become as full of resentment against it as against having to consume polluted water. Active and recognized authority on this subject, his remarks are pregnant, and we think prophetic, when he says that he believes the time is now ripe when smoke (beyond a certain small and specified quantity) from factory chimneys should be made illegal, and that a similar step should be taken in connection with the use of smoky coal in kitchen ranges. There is no occasion, however, for the gas industry to wait for legislation; its air-purifying work can proceed actively and at once to the advantage not only of gas undertakings, but to the community—more especially as it has two forms of smokeless fuel to sell—gas and coke. Mr. E. W. L. Nicol told of the great change that has come over the scene in regard to the use in electricity stations of coke for steam-raising purposes, and how it permits of the employment with it of inferior coal slack, and increases boiler efficiency—thus diminishing the cost of fuel per unit generated. In one London hospital, the saving in fuel by the use of coke instead of coal is at the rate of £2000 per annum.

Looking at all these matters, the question may be asked, Is not the present an exceptionally fine opportunity for the adoption of a bold policy in developing the gas business? There can only be one answer with such clean-cut and material facts before us. Then let there be a re-establishing of business lines as quickly as possible. And not only a re-establishing of old ones, but an adoption of all possible that presents itself, and is good. Our hesitation and our omissions are other people's opportunity. We know that no one formula in regard to principles or practice will apply to all gas undertakings; but there is much that has general application. We have had many inquiries and reports in the gas industry as to its technical behaviour and the qualities of its staple product, but there has not been one into the reorganization and development of work in connection with the gas trading of the industry, under the new conditions as seen through the big openings provided by the Gas Regulation Act. This would not be at all a bad matter for the British Commercial Gas Association to take up. An investigation and report might do a vast amount of good in focussing attention upon this question of trading opportunity. And one point on which there should be rigid insistence is the technical training of gas salesmen; they must be something more than counter hands.

To Co-ordinate the Economical Provision of Light, Heat, and Power.

MUCH has been heard of late years of industrial reconstruction, reorganization, and co-ordination. The words have been bandied about freely; they have formed the texts for

many prepared discourses and extempore deliverances. But so far the writings and the words have more tangible existence than the practical effects. Why is this? In the first place, there has not been that recognition of the economic interdependence of industries which is requisite for the reaping of the best economic fruits, because of the specialized training that is given to the men who have upon their shoulders the technical responsibilities of each industry. They are trained for one purpose; and their professional inclinations and procedure are framed as though their undertaking is an embodiment which must have an exclusive existence, and as little attachment as possible with any other concern or industry. Admittedly, one man cannot be a specialist in all lines of industrial work; and therefore, in order to attain economical industrial development, the next best thing is to organize trained brains and experience in cognate matters, and let them unitedly do the work of co-ordination. That is where industrial reconstruction, reorganization, and co-ordination must start. Reminder (which we adopt as an illustration) is given of this fundamental essential by a paragraph in our "Personal" notes to-day as to a new partnership, under the designation of Sir Charles Bright and Partners, the partners including (in addition to Sir Charles) Lieut.-Col. H. W. Woodall, C.I.E., M.Inst.C.E., Mr. A. Hugh Seabrook, M.Inst.E.E., and Mr. A. J. Stubbs, M.Inst.C.E., M.Inst.E.E. This is a unique partnership, and designedly so. There we have, for consultant and advisory work, a combination of talent, training, and experience in different fields of industrial and technical activity, which will enable projects—particularly all fuel-using projects—to be examined and planned from all points of view, to the end of maximum economy and efficiency, whether to do with civil engineering, or the specialized work of the gas, electrical, or water industries, or cable or other work connected with telegraphy or telephony.

We look at this matter from our own standpoints of light, heat, and power, and of fuel conservation. There is a vast area here in which there is at present a gigantic aggregate of fuel waste. Four industries are particularly interested in the provision of light, heat, and power—coal, gas, electricity, and oil. But never have the problems of light, heat, and power been considered as a whole from the point of view of maximum national and industrial economy. Sir Arthur Duckham has frequently, in his writings and speeches, made a point of this, and has urged that the Government in the national interests should, before it is too late, reinvestigate the question—not in parts, but as a whole. Each industry has always been treated as having an entirely isolated existence without attachment at any point, other than as competitors, or buyers and sellers. There are men who would still maintain this position. They are men void of prescience, who cannot see the advantage of economic interconnection. Despite them, the incipient stages of progress are seen. Let us examine them. A great deal has been said as to the electricity industry prefacing its generating operations by coal carbonization, and adding to its capital commitments something that would go far towards doubling its present capital charges for plant. From the national point of view, this would mean the utilization of coal in excess of what is required for the combined service of gas and electricity supply, and the quantity of coal carbonized by the electricity industry would naturally be in excess of the coal that would normally be employed directly under the steam-boilers, as in present circumstances. Moreover, the secondary products would be subject to the rise and fall of markets; and in the end pre-carbonization of coal might prove, for the electricity industry, a huge mistake. But the roads of relationship and economical fuel utilization have been opened-up between the gas and electricity industries, by the advantages that are found in steam-raising by the use of coke or coke breeze intermingled or stratified with small coal. Now, too, there is the scheme for a large power station at Beckton, with the obvious advantages that would accrue from the jetties, railway communications, and other material handling plant already existing at the gas-works there, and from the coke which can be run direct from the thousands of Beckton retorts to the boilers or to gas-producer plant, for the fuel requirements of a generating station. Why ship to London, handle, and burn more coal than is necessary? We can see no reason—all in excess of need being waste, and therefore uneconomy and a loss of efficiency. The facts of advantages from working association are becoming plainer; ideas are becoming reorganized and co-ordinated. But we are as yet only at the entrance of what may be if imagination and ideals materialize through specialization in this direction. The Board of Fuel Research, in their report on Gas Standards, recognized that gas-works are the places at which to treat coal; and in the Gas Regulation Act powers are conferred upon the Board of Trade to authorize developments, in the case of all gas-works making application, for the supply of power gas—that is, to provide a dual supply of gas, one being for industrial purposes.

There is a further development—that is, the utilization of gas from colliery bye-product coke-ovens by gas undertakings for town purposes; and there will be much more of this gas available when all coke-ovens are constructed for the utilization of producer gas. Then again, blast-furnaces are a source of waste heat in gaseous form for the development of steam, but, as recent events have shown through the coal strike and trade depression, a somewhat precarious one for electricity generation for town supply. The tendency to-day is for collieries with blast-furnace and coke-oven equipment to be self-contained in the matter of heat and power provision; and here again there is vast scope for the combined knowledge of engineers trained in solid and gaseous fuel utilization, and in electrical generation, in order to devise a co-ordinated system to attain the maximum economy in the provision of heat and power. Returning to gas-works. There are combined gas and electricity works in the country, supplying current at, having regard to their size, prices which are the envy of electrical engineers in charge of stations of like degree, but not having the corresponding resources which combination of the two undertakings confers. The jealousy that has hitherto kept electrical and gas undertakings apart is not in the national interests. Furthermore, the technical ramifications of gas-works to-day embrace not only gas production, chemical processes, and tar distillation, but there are upon many works electrical plants, railways, works' water supplies, and so forth, that take the responsible official into several branches of engineering. Even from this superficial review of the position, we see how the industries providing the means for light, heat, and power can have their technical interdependence developed to the economic advantage of the whole, and therefore of the nation. If there was this greater technical and working unity in the gas and electricity industries, the economies effected would do much to undermine the proposed huge isolated super-power stations.

The time is very opportune for concentrating upon these matters. The more they are studied, the greater appear the possibilities. The cost of fuel will always be heavier than before; and this alone makes its economical use by co-operative effort something not only to be desired, but something that is an imperative necessity. The cost of labour will also be greater; and therefore the need for the maximum economy and efficiency being derived per unit of labour cost. The new consultant and advisory engineering firm (consolidating ability, training, and experience in several spheres, and which we have taken as an illustration) is proposing to operate in many branches; and it is this prominent item in policy—the concentration upon heat and power problems—that attracts our attention. The co-ordination, in any set of circumstances, of the utilization of the agents for the production of heat and power, whether the agents be of the solid, gaseous, or other liquid form (oil or water-power), is a matter on which the broadest exercise of skill is required, so that plans, designs, and application may be so conceived that the maximum economy and efficiency will be the issue. In this there is industrial and national profit.

Claude Synthetic Ammonia Process.

THERE are signs in the papers that we shall soon be hearing more of the commercial development of the process of M. Georges Claude for the synthetic production of ammonia from the nitrogen of the air. There have been some announcements in the Press in regard to the system, the details of which have long been known to those interested; and an article on the subject, covering three full columns, has appeared in the "Daily Telegraph." It was by "Our "Special Correspondent," and described a visit to Montereau, where M. Claude has a plant for the production of the nitrogen and a water-gas plant for the provision of the crude hydrogen. The total capacity of the plant in sulphate of ammonia is 20 tons a day. The article tells us that the world is no longer dependent upon Chili or on gas-works for fertilizers; while an advertisement announcement informs us that we in this country are still dependent upon

Chili nitrate for our agriculture, which is not the exact truth, in view of the business that is being done at home in the sulphate of ammonia production of our carbonizing plants. The advertisement statement further remarks that "the "industrial development of the Claude process which will "take place in the immediate future under British control "on a very large scale, will . . . not only render us "independent of imports from Chili, but will secure for the "British farmer abundant supplies of home produced fer-"tilizers at a lower price than heretofore." The points of large-scale production and lower price will be duly noted.

Of course, those who advocate the French Claude process see (perhaps rightly) weaknesses in the German Haber process; and in all probability those favouring the German process are doubtful of the Claude process. The article in our morning contemporary categorically says that, in simplicity, efficiency, and cheapness as regards capital cost of the plant and the operating expenses, the French process "is immeasurably superior" to the German. In general principle, the Claude and Haber processes are akin. The article describes the system of passing the purified nitrogen and hydrogen in the proportions necessary and admixed over a catalyst at a high temperature and under a high pressure. The catalyst employed is iron with other activating substances. As to temperature, a compromise has been effected between loss of ammonia and loss of time, by adopting a working temperature of about 600° C. As to pressure, this is where the Claude and Haber processes have conspicuous difference. The higher the pressure, the more effective it is in combining the gases. Haber uses in the catalyzing vessel 200 atmospheres (or about 1¾ tons) per square inch; and this necessitates tremendous sized chambers. Claude is said to have reduced his plant to a fraction of that required by the Haber process, by getting a pressure of 900 atmospheres (or about 6 tons) to the square inch. At a stroke Claude thus reduced the huge German catalyzer vessels of 40 ft. length and 4 ft. diameter to tubes 6 ft. 4 in. long and only 4 in. internal diameter. These tubes, by the way, are being manufactured in England of a special alloy. The whole plant is greatly reduced in size by this ability to work at a pressure of 900 atmospheres. The article is an extensive one; but towards its close we read that the Claude process "is un-"questionably the cheapest method for making synthetic "ammonia; and synthetic ammonia is the cheapest form "of fixed nitrogen to-day." Confirmatory data and demonstration are required.

Balfour Browne.

That was as we all knew him, without prefix or affix. But the name has been ruled-off the active list through death from heart failure last week. Though he retired in 1915 (when 70 years of age) from parliamentary practice, he still moved and worked voluntarily in other spheres not less congenial to him; and so we still frequently continued to meet him. There he will be greatly missed; and there as in all the ramifications and associations of his large life—professional and social—there will be sorrow and regret that John Hutton Balfour Browne, K.C., has crossed the bar that separates this life from the beyond. He was beloved for himself; he was respected for his genuine attributes as a man; he was admired for those intellectual qualities that raised him to the highest status in light and leading. His knowledge of men, affairs, and matters was wide and varied; his legal learning profound and incisive; his capacity for concentration was great; his ability to banish one case from mind and almost without pause converge his faculties on another was remarkable; his endurance was wonderful, and quite the negation of any judgment that might have been formed as to it from physical appearance alone; his memory was marvellously retentive; his versatility was broad. The combination of talent took him to the leadership of the Parliamentary Bar, where he practised for some forty years; it made him the one most desired in Parliamentary Committee fights, in arbitrations, and in appeals. He was in all the big Private Bill conflicts during those forty years—being retained by large statutory concerns and imposing local authorities. He was equally at home with railway, gas, water, and electricity. He knew the law of each, and much of the technical work of each. Even experts who were upon the other side would sooner have been cross-examined by almost anyone other than Balfour Browne. He never knowingly took unfair advantage; but when it came to a contest of brains, the keenness, alertness, and incisiveness, and the innate love for controversy, sometimes made things very uncomfortable for one of two men, and that one was not Balfour Browne. The gas industry is deeply his debtor for the conduct of many big fights and for his wise counsel. His association with the industry was closer than that of a great legal advocate, defender, or adviser; for in the industry he had many friends. At the meetings of the organizations of the industry, he always had a welcome, as though "one of us." He was President of the Society of British Gas Industries in 1910-11, and was a Vice-President since. During the decade he has been an almost regular attendant at the meetings of the Society, and had consented to take once more the Presidential Chair in succession to Sir Arthur Duckham. He was the author of several legal and other works. Talking one day with Sir Dugald Clerk and the writer, he made the remark that he found writing quite a recreation – in fact, at one time (those were in the youthful days) he had some idea of entering upon a literary career. But the course he did take was the more lucrative. It was only so because he was a worker, and used well those talents with which he had been endowed. Memory runs back a long way into the parliamentary history of the gas industry. As it does so, much more might be written as to the details of the part Balfour Browne took in it. But the details are voluminous; and they have been recorded in volumes the covers of many of which now bear the traces of age.

Sulphate Prices and Quality.

Every little helps. We are glad to see the British Sulphate of Ammonia Federation, Ltd., are in a position to announce further increments in the price of sulphate for November and December. They are not large; but they are welcome. The November figures are 5s. per ton more than those for October, and for December 10s. more than for this month. The November prices are £14 18s. for 25¾ p.ct. ammonia quality; and £13 15s. for ordinary 25¼ p.ct. ammonia quality. For December delivery, the prices are respectively £15 3s. and £14. It will be noted that the 25¾ p.ct. sulphate is to be neutral, in fine friable condition, and free from lumps. It is to be hoped that the time will come when, through the sufficiency of the supply of neutral and dry material, the Federation will be able to omit from their circulars the paragraph announcing that, while they will do their best to meet buyers' wishes with regard to the quality to be supplied, they reserve to themselves the option to deliver either neutral or ordinary quality, at the price quoted for each of the grades. When farmers have used the neutral, dry material, they resent going back to the other, especially when the difference in cost is one which may be swallowed-up easily by the increased labour that is involved in dealing with the ordinary quality, and by the inferior results.

Summer Time.

Summer time ended last Monday morning; and clocks were put back by one hour, so we are again moving and doing gas business in accordance with Greenwich time. A Bill was introduced this year to make the change permanently an annual one; but the congestion of work in Parliament did not permit of the measure being proceeded with. The agricultural interests seem to think the failure of the Bill to make headway was due to their persistent opposition; and one official representative is of the opinion that nothing more will be heard of it. We are not inclined to think so, seeing that outside the farming industry the change is very popular. France is talking of prolonging summer time. It is appreciated there for the substantial savings effected; and there is no violent agitation against its continuance from the agricultural interests. The people in this country who are sufferers are those owners of small electric lighting stations in residential areas that have to depend for business practically on lighting only, and have to incur stand-by loss, salaries and wages, and capital charges, during months of the year when their business is negligible. Summer time in New York came to an end last week. The policy is gaining world-wide favour.

Sulphur Reduction by Oil-Washing.

In the "Journal" for Nov. 10 last [pp. 325, 333], there was noticed a paper by Mr. E. R. Hamilton, read before the Canadian Gas Association, on the removal of sulphur from gas by oil-washing. He has, as was seen by last week's issue, continued his experiments on the working scale, and has supplied some

information for which we asked in our comment last year. It is true Mr. Hamilton has to treat a gas heavy with sulphur through the character of the coal with which he has to deal. His chief difficulty appears to be due to temperature control in the oil treatment; and owing to this the results are very irregular. The expense of operation is high. The figures as to results and costs are not very conclusive. The efficiency does not appear to be good, though there is plenty of sulphur on which to work—varying from 35 to 160 grains per 100 c.ft. During ten months 70 million c.ft. of gas passed through the oil-scrubbers. Some 3000 gallons of wash-oil were used up; and against this there has been a credit of 3000 gallons of crude benzole. Including labour, power, steam, and oil losses, the average expense is 3·34 c. per 1000 c.ft., less a credit for crude benzole of 1·53 c.—making 1·81 c., without interest and depreciation charges. So far as can be judged, the results of Mr. Hamilton's experiments—interesting as they are, and carried on under difficult conditions—will not induce application here, though experimental investigation under our conditions might result in something totally different. Those who have been washing for benzole in this country have also observed a considerable reduction in the sulphur compound content of the gas.

Discarding the Bunsen.

An article containing several points of interest to gas engineers is that by Mr. C. B. Tully in other columns, in which he advocates wiping-out the bunsen burner, by supplying a gas of (say) 350 B.Th.U. He claims that it has been demonstrated in practice that the ordinary consumer gets the "same value" out of a 350 B.Th.U. Tully gas as he can from a 500 B.Th.U. coal gas. If this is substantiated, it means that a much higher efficiency must be obtained from the lower value gas by dispensing with the bunsen. Let us assume that, for a given purpose, the consumer using a 500 B.Th.U. gas with a bunsen gets 60 p.ct. efficiency (300 B.Th.U.), then with the 350 B.Th.U. gas, he would have to get 86 p.ct. efficiency to get the "same value" per cubic foot. Perhaps Mr. Tully attaches a larger meaning to the words "same value" than the single one of thermal efficiency.

Tar-Oils in Germany.

It is gathered from the "Petroleum Times" that the German Government have decided to exempt from coal tax all coal used in the production of tar-oils. This, it is said, is the first official move in a comprehensive plan for making Germany independent of the outside world's oil, and even for converting her into an oil-exporting country. During the war (as is now well known) experiments were made in producing oil from the brown coal, of which Germany possesses huge quantities, and also from her likewise enormous possessions of bituminous shale. No serious technical difficulty has been encountered; and the industry appears to have become firmly established. The output of crude mineral oil in Germany from native raw material was 1,500,481 tons in 1916, which is the latest year for which figures are available. The output of brown coal is rapidly increasing. In 1919 this was 93,800,000 tons, compared with 87,116,000 tons in 1914.

Gas Coal and Coke.

A new light seems to be breaking in the colliery areas as to the relative positions of household coal and gas coal. The former normally is the heavier consumption. But the collieries are getting anxious as to the sluggish demand for domestic use; and they are looking hopefully to the demand for gas being so much heavier this winter that gas undertakings will have to increase purchases to satisfy requirements. Gas-works have been stocking well; but the view is that, in the circumstances, they will be wanting more than the normal supply. In Yorkshire particularly there appears to be a stronger inquiry by gas undertakings; but it must not be forgotten that in industrial areas there is a falling-off of gas use for trade purposes, and unemployment also affects gas consumption. Developments in gas coal demand are reported from Derbyshire and Nottinghamshire. Prices are still in an unsettled condition; and from Northumberland and Durham there is talk of signs of a further fall in best qualities. Some better contracts appear to have been booked for shipment. One which the "Iron and Coal Trades Review" mentions is that for the Aarhus Gas-Works for Wear Specials for delivery over the remainder of this year at 35s. 2d. per ton. Up North there is report of scarcity of gas coke, and of good prices. But the scarcity does not apply to all areas. Demand in some of them is largely a question of which is the cheaper—coal or coke.

OBITUARY.

JOHN HUTTON BALFOUR BROWNE.

IT is unhappily necessary to record here, as is done more fully in the editorial columns of this issue, the death on Tuesday of last week, at Goldielea, near Dumfries, of Mr. J. H. Balfour Browne, K.C., whose name for so many years was one of the best known in the Parliamentary Committee Rooms, and in connection with questions on rating. Among members of the gas industry, for whom he so often acted in a professional capacity, he was almost as well known as he was in the legal world. Indeed, though he had retired from the Bar, his association with gas had not ended at the time of his much regretted death; for he was to have been re-elected President at to-day's meeting of the Society of British Gas Industries, of which, it will be recalled, he was President for the first time in 1910. On that occasion, he succeeded the late Mr. Thomas Newbigging in the chair, and devoted his address to the subject of "Trade and Legislation." In 1914, he was a Vice-President of the Royal Institution.

Mr. Balfour Browne was born in 1845, and educated at Edinburgh University. Called to the Bar by the Middle Temple in 1870, he was four years later appointed Registrar and Secretary to the Railway Commission. On two occasions he was unsuccessful as a parliamentary candidate. If it is true, as is said, that when he was quite young Mr. Balfour Browne showed a novel he had written to Carlyle, who advised him to give up writing, this advice was not at any rate adopted in its entirety; for he became the author of a number of legal works. For instance, there was a book of his, published in 1873, entitled the "Law of Carriers"—followed in subsequent years by the "Law of Rating," the "Rating of Railways," and the "Law of Compensation."

After forty years' practice at the Parliamentary Bar (for some portion of which time he had been Leader), Mr. Balfour Browne retired some five or six years ago; and his experiences formed the subject of a highly-entertaining volume, entitled "Forty Years at the Bar."

CHARLES WILLIAM HASTINGS.

AN APPRECIATION BY "T. H. L."

THERE comes to every man a time when he must lay down the burden of life, and go forward to meet the Dawn. So it was that in the early hours of Wednesday, Sept. 28, Charles William Hastings "passed over" to the fuller life, at the age of 71. To those of us who knew him and loved him for his many qualities, there is the consolation that he died, as he would have wished, "in harness;" his work on the day previous to his death having been carried out with his habitual enthusiasm and exactness.

Throughout a life-long career of endeavour, Charles William Hastings right worthily upheld the best traditions of the Fourth Estate; but it was in trade journalism that he particularly shone. From the editorial staff of "Hobbies," he joined the "Amateur Photographer" more than a quarter-of-a-century ago; and while occupying the editorial chair of that journal, he produced the "Photographic Quarterly," and other works bearing upon the subject of photography. Later, he edited "Page's Engineering Weekly." Prominently connected with the gas industry throughout his life, at the time of his death he was Editor of the "Gas Engineers' Magazine," and of late years was also connected with the Louis Cassier Company, Ltd., as Associate Editor of "Latin-American Engineering," and Assistant Editor of "Metal Industry." Yet in spite of his arduous professional duties and advanced years, he could always find time for social and charitable work. A member of the Anglican Church, he was a licensed lay-reader of Rochester Cathedral. As a Freemason, he built the edifice of his life and work on the plan laid down by the Great Architect, and left the world richer for his life, poorer for his death. His wife pre-deceased him a few months after the death of his only son in the war. He leaves one daughter.

Charles William Hastings believed that "the sweetest canticle is 'Nunc Dimittis' when a man hath obtained worthy ends and expectations." He so ordered his life that he was prepared and willing to go when the call came.

London and Southern District Junior Gas Association.—The Association will open their 1921-22 session at the Westminster Technical Institute on Friday evening, Oct. 28. The new President (Mr. F. A. Frost, of the South Metropolitan Gas Company) promises a varied programme for the session, and adds: "There are still in the area covered by the Association quite a number of gentlemen who, by reason of the technical and administrative positions they hold, are eligible for membership. To these we offer a hearty invitation, together with every assistance it is in our power to afford them. If any further encouragement were needed, I may add that our work has met with the keen approbation, and has received the active support, of numbers of gentlemen occupying exalted positions in our industry, who are fully alive to the importance of any movement for extending the technical training of their staff."

PERSONAL.

A partnership is announced between Sir CHARLES BRIGHT, F.R.S.E, M.Inst.C.E., M.Inst.E.E., Mr. A. HUGH SEABROOK, M.I.Mech.E., M.Inst.E.E., Consulting Engineer (late Chief Engineer and General Manager of the St. Marylebone and other electric supply undertakings), Lt.-Col. H. W. WOODALL, C.I.E., M.Inst.C.E. (Director and Consulting Engineer of Gas and Water Companies), and Mr. A. J. STUBBS, M.Inst.C.E., M.Inst.E.E. (late Assistant Engineer-in-Chief H.M. Post Office), under the style of Sir Charles Bright and Partners, Consulting Engineers, with offices at No. 146, Bishopsgate, E.C. 2.

Mr. ROBERT J. GOODYEAR, who has been associated with the gas-lighting industry for a period extending over twenty years—for the past eight years representing Messrs. Curtis's & Harvey, Ltd., of "Ironclad" gas-mantle fame—has been appointed Special Export Representative for Lighting Trades, Ltd., with whom is incorporated Messrs. Curtis's & Harvey's (Mantle Department), the Volker Lighting Corporation, and the Ramie Company. In addition to his numerous friends at home, Mr. Goodyear is personally known to many "JOURNAL" readers overseas, as during his long connection with the lighting branch of the industry his business engagements have from time to time taken him to the Near and Far East, Canada, the Antipodes, and the two American Continents.

It was a pleasure to his many friends who were at the recent Bath outing of the Southern Association of Gas Engineers and Managers to meet again Mr. NORTON H. HUMPHRYS, of Salisbury, whose name, of course, should have been included in our report among those Past-Presidents who attended. He was also for several years Hon. Secretary of the South-West of England Association of Gas Managers, which in 1896 amalgamated with the Southern Association.

The Chesterfield Corporation Gas Committee have appointed Mr. JOHN HYDE, of Malvern, Assistant Gas Engineer, at a salary of £350 per annum.

Mr. ALFRED EASTON, of Portslade, who died at the age of 71, spent fifty years of his life in the service of the Brighton and Hove General Gas Company, and for a long time occupied the position of Chief Chemist. He retired in 1915.

The staff of the Accrington District Gas Board last Friday presented Mr. H. ROBERTS, who recently resigned the position of Outdoor Manager after over eighteen years' service, with a handsome case of cutlery, as a token of their esteem and appreciation. Mr. A. J. Harrison (the Manager) presided; and the presentation was made by Mr. R. T. Holgate, the oldest servant, who spoke of the long and pleasant association they had had with Mr. Roberts.

Mr. GEORGE LINDLEY has been appointed Manager of the Dukinfield Corporation Gas-Works, in succession to his father, the late Mr. William Lindley. The commencing salary is £312 per year. Mr. Lindley started as a boy at the works 25 years ago under the late Mr. Harrison Veevers, and rose to the position of general foreman in 1905, when his father was appointed Manager. The new Manager was a student of the gas manufacture classes at the Manchester School of Technology.

ELECTRICITY SUPPLY MEMORANDA.

ELECTRICITY has had a special article in "The Times." It is headed "The Woman's View—The Third Hand;" and it is from a Correspondent. We are not going to quarrel with the writer (he is moderate in what he says), but electricity may be complimented upon getting such a prominent advertisement.

Discretion.

At the same time we are not envious, because those who read the article with care will find in it sufficient evidence that, if electricity can rightly be called the "third hand" in domestic work, then it is a hand suffering from paralysis, and thus has considerable limitations. The more thoughtful, too, who know the extent to which gas is used in the United Kingdom for cooking, room heating, hot-water supply, ironing, and several other purposes will question the title of electricity to be termed the "third hand." The "third hand" on account of its extensive labour saving in the home life of rich and poor alike in the country is gas; electricity is more or less a pretender, or a mere loiterer on the outskirts of practicability in domestic heating. We do not dispute the usefulness of electricity for many small jobs in domestic service; and any labour-saving proposition that is economical is sound in these days when domestic service is not looked upon with the same good feeling as in the old days, and when so many who are now willing to take domestic service are not prepared to "sleep in." When it is written that "we cannot expect electricity to break the back of domestic drudgery," it is felt that the writer is not attempting to take too high a flight, as some of his electrical contemporaries are prone to do. This is confirmed when the writer remarks that, for those who have to keep expenditure continually in mind, the prevailing high cost of current in London and many large towns is an insuperable bar to the sole use of electricity for cooking and heating. This is evidence of the limitations of electricity. When he speaks of the electric grill, coffee percolator, egg-boiler, milk-heater, flat irons, and vacuum cleaners, then there is not much to complain about; but the criticism may be made that, if cooking and heating are too expensive for general use, then proportionately these smaller uses will also be expensive. Moreover, these small articles are usually connected up to the lighting circuit, and so, instead of the energy used costing from 2d. to 3d. per unit, the unit may cost anything between (say) 8d. and 1s., according to the area of supply. The reader, too, will give due weight to the concluding paragraph of the article, which acknowledges that "a modicum of horse sense is needed in the use of electrical appliances, for they are not all yet quite fool-proof. The fact, too, that the cooking utensils must be cleaned dry, and not immersed in water, occasionally causes temporary difficulty. But the merits of the better class of apparatus are so obvious, even to the eye of the ignorant underling, that it is usually treated with respect." "Usually" is not the correct term. There is a fair amount of discretion in the article. At the same time, does the article in reality represent "the woman's view?" There are a good many women in the country; and relatively the users of electric appliances among them are few.

"Safety First."

The safety of electric lighting in respect of fire generation is one of the playful claims of vendors of electricity and electric appliances. But, of course, the public nowadays know what value to place on the claim. Electric lighting is common in large buildings owned by wealthy people or companies; and when there is misbehaviour on the part of the lighting agent, as a rule the destructive results are of a serious order. The entire Fire Brigade of Paris was required to deal with a fire last Wednesday at the Grand Magasins du Printemps. The damage done is estimated at millions of francs—apart from the destruction of buildings, the contents that were destroyed are valued at 50,000,000 frs. The reports from Paris all concur in attributing the origin of the fire to a short-circuit in the kitchen of the tea-room.

Destination of Surplus Profits.

It will not be surprising to see a conflict between industrial users of electricity and ratepayers over surplus profits, with (as more is learned of the matter) the ordinary consumers joining in as opponents of both. In several places we have seen industrial consumers showing resentment over recent increases in cost of current for power purposes, even though under a coal clause, which we regard as an unfaithful thing in these times so far as other consumers are concerned, with all other charges up (wages, materials, rates, &c.), and industrial use of energy on a low scale. Generally speaking, the power consumers are getting off very lightly in these times; and if there are surplus profits to apply to some purpose, we think they should be utilized either for the benefit of the whole undertaking or in a general reduction of charges. Certainly they ought not to go to the ratepayers. Electricity has risen to its present high price owing to abnormal conditions, some of which are being hardened into normal ones; and therefore, in reality, there ought not to be excess profits. Their presence shows a charge beyond the need; and the greatest bearers of the burden of higher charges are the lighting consumers. We have no particular interest in defending them or any other users of electrical current; but there is a principle involved in which gas undertakings are as interested as electricity concerns. The matter has had somewhat keen discussion at Sheffield. There the Electricity Committee (very properly we think), having an excess of £100,000, decided to place it to the credit of the renewal fund for the benefit of the whole undertaking. But two or three parties came in, and wanted to have big slices off this. One desired that £25,000 should be carried to the relief of the rates, so bringing about a reduction of 3d. in the pound, while other advocates urged that it would be wiser to use the money to supply cheap power. The money was made not by the ratepayers as a body, not by the power consumers alone, but by the business done by the undertaking as a whole—the largest contributors being those who are charged most per unit for current. However, notwithstanding that the Electricity Committee were right in desiring to keep the money in the undertaking for its benefit, and therefore to the advantage of the electricity consumers, the Council turned the balance in favour of a reduction of the rates, and so walked-off with £25,000. The Manchester Gas Committee have secured an Act of Parliament, with the concurrence of the Council, which particularly specifies how gas profits are to be dealt with. Surpluses not required by the undertaking are to be saved-up for utilization in making reductions of gas prices.

The Coal Clause Muddle.

A contributor of an article in the "Electrical Times" shows how badly coal clauses are working out for electricity stations, and how well for power consumers in these days, all other considerations being omitted in determining the price they have to pay. Within the past few weeks, this contributor has realized that, if power tariffs are not immediately revised to meet present-day circumstances, the income of his undertaking during the next few years will in all probability be very considerably below its expenditure. His power tariffs include a coal clause. But electricity undertakings use small coal under their boilers; and this is the class of coal that has slumped heavily. The result will be that the average price of coal delivered at the generating station will be considerably less than it has been for some time past, and the price of energy per

unit will also be considerably less, owing to the slide under the coal clause. Yet, though wages and materials have fallen to some extent, it has not been in the same degree as the decrease in the cost of coal; and so income is diminishing at a much greater rate than expenses. It is therefore apparent that, unless an immediate alteration is made in the basic charge for power, in the direction of raising it so that it includes an amount to cover the whole cost of wages and material, the department will be unable to make both ends meet. Many other undertakings are in a similar predicament.

Small Power Electric Lamps.

Electric lamps of low candle power and small current consumption, for use at ordinary voltages, have constituted a problem which lamp manufacturers have been long trying to solve. The General Electric Company, Ltd., claim to have accomplished the feat. In the new lamp—known as the Osglim—an entirely new principle is embodied. No filament is employed, but a glass bulb of the usual shape, and containing a quantity of the rare gas neon, is fitted with two metal electrodes placed a short distance from each other, and attached to the two terminals of the standard cap. The anode is connected to the lamp contact by which current enters, and the cathode to the contact by which it leaves. When current is switched-on, a discharge takes place between the two electrodes, which produces a light of a characteristic orange colour appearing as a luminous haze over and above the cathode. Each lamp consumes about 5 watts. Who is going to provide the meter for measuring the consumption of such lamps?

An Oven over the Boiling Elements.

In one of the electrical papers, an illustration is given of a new electric cooking range which is a striking departure in design from the ordinary cooker. It stands on legs at a convenient height. The boiling elements are on a table with the switches in front, and the oven is carried on brackets above the boiling elements. This is a reversal of the usual order of things. But we would suggest that there are disadvantages in this. It will be very awkward to have boiling utensils at work with steam escaping while attention is being given to the oven. There will always be the danger of knocking over the boiling utensils while looking after the food being cooked in the oven; the heights of the boilers that can be used will be limited by the intervening space; and the escaping steam will condense on the oven when cold, and, when the latter is in use, the steam will find entrance into the oven. It is to be demonstrated whether the translation of the oven to a higher position is a real advantage.

Publicity Extravagance.

The publicity agents of the electricity industry are very busy. "The Times" has had a short notice of the first report of the Electricity Commissioners, showing the progress of their work in the promotion of regional generating schemes under Joint Authorities. The article is headed "Cheaper Electricity for Industry." How does "The Times" know that cheaper electricity is to be the result? It is what is hoped for; but it is something that has yet to be demonstrated. Some electrical engineers of high standing have very grave doubts regarding the matter. The "Daily Telegraph" last Thursday had a notice of "Electricity as a Labour Saver." The "Daily Chronicle," too, has had an article by one "S. L. Bensusan." It reminds us of the extravagancies indulged in by the lay Press when the Electric Power Committees' reports were issued. The article has four headings—all models of absurdity. "Electrifying England" is the uppermost one. "Coming Revolution of Industry" the second. "Smokeless London" the third. "When Coal is Banished from the Home" the fourth. We see no prospect of "England" being electrified otherwise than at a prohibitive cost. Seeing how small a part of industry's works' cost is represented by power, and how low power costs actually are, in so many industrial works having their own private plants, we do not discern how anything that is being done now can be called a "coming revolution of industry." And London will never be rendered smokeless and coal be banished from the home by electricity even if generated at 20 p.ct. efficiency; and anything between (say) 3 and 8 p.ct. is about the efficiency range of to-day—the mean being a very general figure. Such writing as we see in the article in question is all very silly. Facts are ignored, in order to produce something of the so-called "popular" order. In what we suppose is an editorial preface to the article, it is stated that Mr. Bensusan "predicts that the time is not far distant when electricity will take the place of coal for all domestic purposes, and when fog will be unknown in London." Such a prediction discloses ignorance, and an incapacity for giving due weight to the facts governing the position. A more economical proposition is found in gas. The article itself is all superficial and visionary; and it is just such publication that the more level-headed electricians deprecate, for they know "the goods cannot be delivered."

National Association of Technical Gas Officials—The deferred second annual general meeting of the Association will be held at the Central Hall, Westminster, on Tuesday afternoon, Oct. 11, at 4.30, when the agenda submitted will be that sent out to members for the postponed May meeting.

POLICY OF THE SOCIETY OF TECHNICAL ENGINEERS.

THIS Society has issued a statement of its policy; and it appears in the September issue of its own "Journal." At one time it was considered impossible to get men engaged in technical official positions in industry to combine not only for their individual good, but for collective constitutional action in raising to, and maintaining in, good status their particular profession, while at the same time promoting the interests of their respective industries. A new outlook is presenting itself to the technicians of industry. They see the large part they, as the technical brains, have in the success of industry, and that the more science is applied to industry, the more they have to compass, and the larger must be the extent of their knowledge. The technical men are the real captains of industry. Nevertheless they found themselves, though such essential parts of the industrial system—as essential as capital on the one hand, and as labour on the other—simply individuals between the organized bodies of employers and employees, and through this the greater has become the weight of responsibility resting upon them. Now many technical men are in the membership of the Society, and more are wanted, so as to make the organization as strong as possible. It is felt that, united for the protection of their individual interests, they can better promote work for the advancement of the industries generally, through widely cast co-operation and inter-communication. We see nothing in this that is not sound from the points of view of industry and of the public generally. The policy and objects of the Society may be briefly stated as follows:

1. The Society has recognized and agreed that its objects fall into two groups—the first, objects connected with the interests of individuals and of the profession; the second, those connected with the advancement of the British engineering industries.
2. In the next place it has been decided that in every action taken to secure any of the objects in the first group—*i. e.*, the interests of individuals and of the profession—consideration will be given to the effect of any such action on the firm to which the members concerned belong, and also that the interests of the industry in general shall be kept in mind.
3. Lastly, we have come to decisions as to our relations with employers on the one hand and with the manual workers on the other. In regard to the former the Society will attempt to establish communications with employers and with organized employers in pursuit of both groups of its objects. In dealing with the manual workers, however, while the Society will not associate itself with the labour movement, nor seek to join the Trade Union Congress, nor make common cause with the Trade Unions of the manual workers, even with those connected with the industry, in pursuit of improved conditions of service, it will, nevertheless, most earnestly seek to find some means of co-operation with unions of manual workers, connected with the industry, in pursuit of the second group of its objects—viz., those concerned with efforts to secure the advancement of the engineering industries of the British Empire.

In the gas industry, there is, of course, already in existence an Association of Technical Gas Officials, with whom the Society of Technical Engineers (whose address is 102, Belgrave Road, S.W.) would be glad to establish points of intimate contact. The two bodies have had some conversations together, but the latter having been so preoccupied with the details of their preliminary work, have been obliged to leave this important matter over.

THE NEWEST GAS.

By C. B. TULLY.

IN such a conservative industry as the gas industry things move slowly; and it took the war and the subsequent disastrous coal strike to force upon the industry the necessity of considering, in self-defence, the most efficient method for the distillation of coal. This, I maintain, is by means of what has come to be called the complete gasification of coal; and had it not been for the upheaval in the industry caused by these events, it would probably have taken a life-time to come into general use.

It is over forty years ago since the late London Gas Company discontinued the supply of cannel gas to their Belgravia district; and it took twenty years from that time to get down to the No. 2 Metropolitan gas-burner, and another twenty years to arrive at the sale of gas on the therm basis. It will probably take another twenty years before the gas industry generally can settle-down to sending-out a gas that the consumer really wants, and can use efficiently. At the Gas Institution meeting on June 13, 1900, Mr. Webber gave a lecture entitled "The New Gas;" and I very well remember the discussion that it caused at the time—outside the meeting. Needless to say, I was extremely interested in the lecture; and no doubt it bucked me up to experiment on the same track, and is more or less responsible for my work at present.

The question as to the most suitable B.Th.U. for the future is being weighed-up, and various opinions are being put to the test. The majority of gas undertakings favour about 450 B.Th.U. gas. Of course, the type and condition of the carbonizing plant in existence, the question of distribution, and existing apparatus have an influence on this decision; but the gas of the future will

to my mind, be from 350 to 375 B.Th.U., or the gas which gives the maximum therms per ton of coal. And this will be obtained by complete gasification in such a plant as the Tully plant.

The gas the consumer needs to-day is a gas he can burn with the utmost efficiency. Every gas manager knows that the highest efficiency of straight coal gas for lighting can only be obtained by using some system of high-pressure distribution, and by this means introducing the extra air required to obtain the fullest efficiency of the gas. The ordinary consumer cannot afford the expense of a high-pressure system, and has consequently to suffer the loss.

Any gas engineer who has studied the chemistry of the combustion of flame will understand just what I mean. The gas that I have been aiming to produce, and the one I have succeeded in producing, is a gas that can be used "straight" by the consumer without a bunsen burner or the admission of primary air. The bunsen burner has no doubt done more for the gas industry (with the exception of the Auer burner) than any other invention. At the same time, used in the ordinary burner, it has wasted a large amount of gas and polluted the air with carbon monoxide. By wiping-out the bunsen burner, the gas industry can gain infinitely more than it did by its introduction.

With Tully gas, the use of the bunsen burner is not necessary; and no secondary air is required. This alone will reduce burner and mantle maintenance costs by more than one-half, obviate all lighting-back and sooty mantles, and about double the life of the mantle. Tully gas will take a certain amount of air, and by dropping the bunsen there is probably a loss of about 5 p.ct. in lighting efficiency. But this is more than compensated for by the softness and beauty of the light compared with the dazzling whiteness of the bunsen incandescent burner.

When using Tully gas it has been demonstrated in practice that the ordinary consumer gets the same value out of a 350 B.Th.U. gas as he can from a 500 B.Th.U. straight coal gas. This being the case, it stands to reason that apparatus which has been scientifically adjusted will not suffer.

In a small works which I took at Kingscliffe before the war, for the purpose of satisfying myself, and demonstrating the possibility of sending out straight Tully gas, I found (over a period of several years) that the gas was perfectly satisfactory for all domestic purposes, as well as for driving gas-engines and firing furnaces of various descriptions. Three towns are now being successfully run entirely on Tully gas, and orders are in hand for other towns with this object in view. One small town is making 34,000 c.ft. per day of 350 B.Th.U. gas from 13 cwt. of coal run by one man in an eight-hour shift. In larger plants, about 60,000 c.ft. per ton is obtained.

The consumer wants a good, cheap, clean gas that is fool-proof, and can be used efficiently. He does not want a gas surcharged with hydrocarbons which he cannot use, but for which he has to pay, and which actually cause him loss and damage by blackening ceilings and polluting the air. If he buys gas on the therm basis, he wants to get the utmost value for his money; and if he gets off paying for inerts he certainly does not want to pay for surplus and useless hydrocarbons. Bunsen invented his burner for coal gas rich in hydrocarbons—the gas being already in existence; and it cannot be perfectly consumed without it unless means are provided for supplying the extra air required for the aëration of the flame, as in high-pressure lighting.

With Tully gas the consumer turns on the gas full by the tap at the burner, and regulates it until he gets the maximum light with the minimum consumption of gas. No lighting-back or breakage of mantles occurs. The gas can also be turned-down when required, without lighting-back—another source of economy. In a ring-burner with Tully gas we have an intensely hot short flame, with the result that the consumer gets full value for the B.Th.U. in the gas. Gas undertakings have their opportunity now; and if they do not grasp it, they are going to lose most of their industrial business. At the present moment, we are being asked for plants for industrial purposes, to produce a gas from coal of 335 to 350 B.Th.U., or something better than blue gas. These inquiries are numerous, and come from all over the world. They range from 100,000 c.ft. per day to 5 millions per day. It is being recognized by industry that their very existence depends now upon fuel economy and labour-saving machinery; and this can be achieved to a large extent by adopting a good cheap gaseous fuel.

There were never so many opportunities for the younger generation of gas engineers (not only in the industry but outside it) at the present time. If they will go forward and courageously tackle the problems which confront them, there is a rich reward awaiting those who use their intelligence and energy, and adopt modern methods and practice. Let me remind them that:

> The heights by great men reached and kept
> Were not attained by sudden flight,
> But they, while their companions slept,
> Were toiling upwards in the night.

Arrangements have been made for the Manchester and District Junior Gas Association to visit the Rochdale Gas-Works on Saturday of this week, on the invitation of Mr. T. Banbury Ball (Engineer and Manager). The Chairman and members of the Gas Committee will be the hosts of the Association at tea. Afterwards Mr. J. B. Stewart, of Rochdale, will deliver his Presidential Address.

PURIFICATION FROM SULPHUR BY CHARCOAL.

A paper read before the Association of German Chemists at Stüttgart, by Dr. A. Engelhardt, has been translated in abstract by Mr. E. C. Buck, of the Barrett Company, New York, and published in the "Gas-Age Record." It gives an account of a process for the purification of illuminating or coke-oven gas by removing the hydrogen sulphide by preferential catalytic oxidation over a layer of activated charcoal, with recovery of sulphur preferably by solvent extraction from the spent charcoal with chlorobenzenes.

In the application of the process to gas purification, the crude gases are cooled, the tar is separated, and the ammonia is removed, except for the small amount needed for the desulphurization process proper. This cooled gas, after having been freed from naphthalene, is mixed with the air necessary for oxidation, and allowed to pass through a layer of activated charcoal, the cross-sectional area and height of which are dependent on the sulphuretted hydrogen content of the gas, the quantity of oxygen and ammonia present, and the volume of gas to be treated. The height of the charcoal column is further regulated by the permissible loss of pressure. The reaction temperature also is dependent on the sulphuretted hydrogen content of the gas. Upon issuing from the charcoal filter, the gas is free from sulphur. It is then again cooled, and freed from the remaining traces of ammonia by washing. With producer gas, this would complete the purification process; but in the case of coal-carbonization gases, there would still follow the extraction of the hydrocarbon vapours, which, it is said, could likewise be effected by another Bayer activated-charcoal process.

When the charcoal layer is saturated with sulphur, the gas is turned on to a second filter, and the sulphur extracted from the first by means of a solvent, until the last runnings, on cooling, no longer deposit any sulphur. The solvent still remaining in the charcoal filter is then steamed through a cooler and condenser; and the hot filter mass is blown with sulphur-free gas until cold. Thereupon the regenerated charcoal is ready for another absorption. The isolation of the sulphur from the solvent is dependent upon the properties of the latter. When chlorobenzene is used, the mother liquor is separated from the crust of sulphur crystals clinging to the wall of the tank; and the chlorobenzene still wetting the sulphur crystals is driven off by steam. From the residual aqueous sludge or crystalline sulphur, the sulphur is separated by suction-filtration and drying.

Considering the advantages accruing from the adoption of these proposals, the author points out that the process is distinguished from the customary purification methods in that it does not necessitate the handling of bulky masses. Furthermore, the ground space needed for the apparatus, and the amount of power required, are both small. From the purely chemical point of view, the procedure is just as simple as the bog iron process, thereby rendering superfluous all permanent scientific control. Thus, with regard to the cost, the economic balance of the process shows a distinct advance over older methods.

VRAIG GAS-DRIER FOR PRINTERS.

Referring to an industrial use of gas that holds great possibilities, Mr. Ismar Ginsberg, B.Sc., writing in the "American Gas Journal," says that the bugbear of the printer is static electricity and its accompanying effect, known as off-setting. Static electricity is developed by the passage of the paper through the printing machine; and its worst effect is off-setting. Before the advent of the gas-operated ink-drier, an unprinted piece of paper was inserted between every two sheets. Many attempts have been made to devise ways and means of counteracting static electricity and off-setting; but he claims that the only really successful apparatus for overcoming these difficulties is the Vraig gas-operated drier. As far as static electricity is concerned, this can be removed equally well by gas or electricity. The impinging of a layer of hot gas, air, or steam on the printed sheet as it leaves the press, will cause the discharge of the electricity that is present in any sheet of paper. It is, however, altogether different where off-setting is concerned. The electrical heating attachment to the cylinder printing press will do fairly well in light work; but it fails altogether in heavy colour work.

As to the Vraig drier, the important fact to bear in mind is that far better results are accomplished by the use of gas. The printed sheet is heated on the upper or under side, as suitable; and the device works automatically, the gas being ignited as soon as the press stops. What actually happens to the ink with the use of gas which does not take place in the case of electricity, cannot be stated absolutely. When electricity is used, a layer of hot air is interposed between the printed sheets; while with gas a mixture of water vapour and carbon dioxide, with perhaps a little carbon monoxide, is interposed. The drying of printing ink is due to the oxidation of the linseed oil used in compounding the ink. There does not seem to be any substance present in the products of combustion that are obtained from the burning of gas that would tend to accelerate this oxidation. It may, the writer thinks, be that the action of the gas is merely mechanical, as the burnt gases are actually caused to strike against the printed sheets; while in the case of the electrical appliance there is no similar blowing action of the hot air against the sheets.

THE BRITISH COMMERCIAL GAS ASSOCIATION.

TENTH ANNUAL CONFERENCE IN GLASGOW.

The Tenth Annual Conference of the British Commercial Gas Association opened in Glasgow on Tuesday of last week; and the proceedings, which were of the usual diversified nature, extended over Wednesday. The opening session which was held in the Royal Technical College, Glasgow, was presided over by Mr. D. Milne Watson, M.A., LL.B. (President of the National Gas Council and Governor of the Gas Light and Coke Company). Accompanying Mr. Milne Watson on the platform at the inaugural proceedings on Tuesday forenoon were Lord Provost Thomas Paxton, J.P., of Glasgow, Sir John S. Samuel, the Lord Provost's personal Secretary, and leading members of the General Executive Committee, with the Executive Chairman, Mr. F. W. Goodenough.

Lord Provost Paxton, on behalf of the Corporation and the community of Glasgow, welcomed the delegates at the outset. He confined his remarks to the usual civic courtesies, explaining that he would, later on, have opportunities for touching upon the scope and usefulness of the Association.

The Presidential Address.

Mr. Milne Watson's Presidential Address will be found on p. 710 of last week's issue of the "Journal." The following addition was made by the President when delivering it.

Increased Gas Demand and Trade Revival.

I should like here to urge upon gas undertakings generally the importance of leaving no stone unturned at this immediate juncture to create an increased demand for gas and gas appliances. By so doing they can play their part in bringing about the revival of trade for which the whole world is so anxiously looking, and which is the only sound and radical cure for unemployment.

A bold policy of business development at the present moment doubtless presents financial difficulties in many quarters. To purchase large numbers of gas appliances and let them out on hire means money; and money is none too easy to find in these times. But unless someone has the courage to face and overcome difficulties, we shall never get the "virtuous circle" started—the circle that goes from increased sale to decreased cost of production, decreased cost to lower price, from lower price to increased sale; and so round again and yet again. We have had enough of the vicious circle of rising prices and shrinking demand. Let us get the virtuous circle going well, and we shall soon solve the unemployment question.

The Company with which I am most closely connected are publishing advertisements this week notifying the public that we are prepared now to resume the supply of gas appliances on simple hire. If we had paid regard solely to present-day conditions of the markets for goods and for labour, and for money, it is very doubtful whether we should have taken this step just yet. But we felt it was our duty to take that "first step which costs," in order to contribute our small share to the much-needed revival of trade. If conditions of finance prevent the industry generally from taking a similar step, and if the makers of gas appliances are unable to help them to do so, the question may arise of seeking temporary accommodation from the Government, though most of us have had enough of Government interference with industry to make us somewhat shy of seeking its aid. And anyway, at the most, what industry wants is financing, not subsidizing—neither labour nor capital wants doles. Labour wants work; capital wants to find work for labour. The mass of the people want the bread earned by honest work, not the millstone of charity, which will only serve to sink the nation deeper in depression. The workers of this country are educated, thinking men—not mere ignorant serfs—and, consequently, they do not expect miracles. But knowing that the British Empire is not bankrupt, they do expect such practical common sense and statesmanship from those in charge both of industry and Government as will find a way whereby they can, literally, work out their own salvation and that of their country. What I want to say to all those in responsible positions in industry is—Don't let us all wait for the Government or somebody else to do something. The trade of this country was created and raised to the leading place in the world by the energy and enterprise of individuals, not by ministries or departments; and only by the energy and courage of individuals can that trade be restored to its one-time magnitude and prosperity.

Councillor Mackenzie (Aberdeen), in formally moving a vote of thanks to the President, said they had listened to a brilliant and instructive address.

Ex-Provost Harley (Dunfermline), who seconded the vote, observed that the address which the President had given them constituted what he would describe as a clear exposition of the present-day merits of gas, besides foreshadowing, with a masterly touch, the prospects that lay before the industry. There seemed to be no question of this—that concerted and organized action, such as the Association stood for, was an influence which was making itself felt throughout the whole country. They were all bound to admit that the controversy between the merits of gas and electricity was now one of very long standing. In this connection, he could recall the period when there was a big slump in the gas industry. Everyone then appeared to think that the gas industry was going to be wiped-out altogether, and that electricity was certain to prove victorious. Just two years ago, however, he heard Mr. Fyfe, the Chief Sanitary Inspector of the City of Glasgow, make a surprising statement. He declared then, in no unmeasured language, that, so far as sanitary results were concerned, gas was superior to electricity. This was an idea which up to the present had not been generally entertained; but it had been demonstrated conclusively by facts and figures that there was a great deal of truth in the assertion made. So far as housing schemes were concerned, he personally did have the feeling that the gas industry had not been, and was not being, fairly treated by the Government. It so happened that he (ex-Provost Harley) was in the unfortunate position of being a Director of the National Housing Council, which had been developing a series of schemes in the neighbourhood of Rosyth. In this capacity, he had come closely in touch with the heads of the Government; and he was bound to confess that, when one came into immediate contact with the Government, one's estimation of those who dominated the legislation of the masses was not enhanced thereby. For the Rosyth schemes, he had put forward a strong plea that electricity should not altogether be preferred to gas. For instance, he argued that one tenant might have a preference for electricity, while another was equally certain that gas was what he desired above everything else. Accordingly, to meet the different needs, he had suggested that, at all events, the necessary pipes and fittings for a gas supply should be introduced in connection with the housing schemes at Rosyth. This course had not been followed; but he had since had reason to believe that there was a feeling of general regret that his suggestion had not been given effect to.

The President, in a few words, acknowledged the vote of thanks.

Annual Report of the Committee.

Mr. F. W. Goodenough (Executive Chairman), moving the adoption of the annual report, mentioned the fact that arrangements had now been completed for the publication, very shortly, of a book of "Notes for Teachers," which dealt exhaustively and interestingly with the manufacture, distribution, and use of gas. Advance copies of the publication, which were not absolutely complete—because two or three pages had still to be revised—would be available for members of the Association to take away with them from the conference. It was the belief of the Executive that this particular publication would prove of great advantage in furthering propaganda work. The cost of the book would run out at not more than 5s. per copy; and he personally had the expectation that it was just such a work as would make a very good selling line. The subject was divided into a series of lessons, showing how gas was made, its properties, and its manifold uses in the home and for industrial purposes. In addition, there were lessons appended on general knowledge and domestic economy. Proceeding, he said it was now his duty to present to the meeting the accounts and the report for the past year. To his mind, the principal feature of the accounts lay in the amount of reserve that they were carrying forward to next year. They were very glad indeed at this juncture to have a substantial sum in hand to start the necessary work that they must undertake next year; while they had carried forward £4000 as a reserve for a smoke abatement campaign. Discussing the ten years' work of the Association, the speaker contended that, whatever success the Association had met with in the past, had been due to their efforts to give service to the industry. They had tried to make their work serviceable to the community; and they had sought to be of service to the gas industry in helping it to serve the community. After all, the value of an Association such as theirs largely depended on the extent to which the individual undertakings of the industry would work and use the services that were given to them. In the difficult times that lay ahead, the Association would strive to better the service that had been already rendered. He was bound to say that the most conspicuous example they had had of service to the industry within recent years had been that which the National Gas Council had rendered. The record of achievement of the National Gas Council was one of which it had the greatest possible cause for feeling proud. As the President had indicated in the course of his address, the service of the "B.C.G.A." largely consisted in educating the public in regard to the possibilities of gas. This was effectively carried through by a national campaign, or by helping individual undertakings to carry out local campaigns. The Association's work was unseen, as well as seen; and very often, indeed, the unseen part of their activities had been of the greatest value and importance.

Alderman Waddington (Halifax) had much pleasure in seconding the resolution, because he believed that the policy of the "B.C.G.A." was a sound one. To his mind, they were advocating a programme, and pursuing a policy, which was all to the good.

In the course of subsequent discussion, suggestions were made by individual delegates with a view to ensuring that the Association's new publication, "Notes for Teachers," actually did reach the hands of responsible teachers.

The report and accounts were thereupon adopted unanimously.

The Association's New President.

The President announced that the Scrutineers, as a result of of the ballot, certified that Sir George Davies, the Vice-Chairman

of the Bristol Gas Company, had been elected President for the ensuing year.

Sir George Davies said he had to thank the members cordially for the honour they had done him. He appreciated the honour all the more when he reflected on the many distinguished men who had filled the office. They looked back with pride on the work of men of eminence in the profession, like Sir Corbet Woodall and the Rt. Hon. Lord Moulton, who had been signal successes as Presidents of the Association. But, on the whole, he felt it was true to say that none had done greater work for the gas industry than Mr. Milne Watson. They all knew that, during the last few years, there had been, notwithstanding the difficulties of the war and the coal strike, a large and growing appreciation throughout the country of the value of gas. This appreciation, he thought, had been particularly reflected, as the President had reminded them, in the value of gas as an agency for heating and cooking. Naturally, of course, those who believed in the gas industry might think that the growing appreciation he had alluded to arose out of the real merits of the article they were selling. To some extent this might be true; but he thought they must fairly assume that a great deal of the success which had been obtained generally by the undertaking, notwithstanding the difficulties that had been enumerated, was due to the activities of the Association. There had been of late years a large and increasing sale of gas; and this he felt must be attributed to the "B.C.G.A.," which had certainly put gas in higher favour than it enjoyed in years gone by. The influence of the Association was not solely confined to its commercial activities—it extended to the managers and directors of gas concerns. Before resuming his seat, he extended a hearty invitation to the members to hold next year's annual conference in Bristol.

The formal business of the forenoon session on Tuesday concluded with a vote of thanks to the officers of the Association; and in this connection emphasis was laid on the splendid work which was being done by Mr. F. W. Goodenough, as Chairman of the Executive, and by Mrs. Cloudesley Brereton.

The Civic Luncheon.

At the adjournment interval on Tuesday, the members of the Association were the guests of the Lord Provost, Magistrates, and Town Councillors of Glasgow at luncheon, which was served in the Banqueting Hall of the Municipal Chambers. Lord Provost Paxton, who occupied the chair, was supported by the President of the Association and Sir George E. Davies. A number of representative citizens were present. There were only two toasts, in addition to the usual Loyal one.

Lord Provost Paxton, proposing "The British Commercial Gas Association," said he personally had the greatest admiration for and appreciation of the work of the Association. In Glasgow the activities of the Association had always been viewed in a most important light; and as a former President of the "B.C.G.A." he was glad Glasgow had this year been chosen as the *venue* of the annual conference. In particular he was pleased that questions of hygiene, smoke abatement, and the general pollution of the atmosphere were to engage the attention of the delegates attending the conference. He was hopeful that a consideration of these subjects would lead them far towards the solution of a problem which in recent years had occasioned anxiety and perplexity. Personally he had always held the view that great waste was incurred and that much preventible abuse had been tolerated to the detriment of the health of large communities by neglect of the most elementary safeguards and lack of proper appreciation of the more economical methods of smoke prevention. He felt emboldened to say that the recent miners' strike had not been without its compensations. It certainly had served one useful purpose in demonstrating to the country the possibilities of securing a pure atmosphere and clear skies by the elimination of smoke and the conservation of coal products. He (Lord Provost Paxton) had read the annual report of the Association with great interest, and he was glad to find that its propaganda work continued to be pursued with vigour—particularly in the direction of emphasizing the advantages of smokeless fuel as a means towards the solution of the problem of the pollution of the atmosphere. Then he had also been pleased to note that the economic advantages of carbonizing coal, instead of burning it in crude form, had been one of the important directions of the Association's activities. In all these matters he could assure the members of the "B.C.G.A." that the Corporation of Glasgow took the profoundest interest. On behalf of his colleagues as well as for himself he wished their deliberations on this occasion every success. In Glasgow, some five or six years ago, they started a crusade against impurities in the atmosphere. As a result of the lectures and demonstrations which were given by experts, they of Glasgow Corporation made themselves believe, rightly or wrongly, that an improvement had been effected. They were much in earnest at that time; and their mainstay then was Mr. Peter Fyfe, the chief sanitary inspector. Mr. Fyfe since then had worked in season and out of season to induce people to believe that it would be far better to use smokeless fuel. Proceeding, the Lord Provost said he had a word to offer to appliance makers. Was there not a sufficiency of inventive genius within their ranks to enable them to produce for a Scottish house of the tenement type a grate that would consume gas and save all the cleaning of the raw-coal fuel? If such a grate could be designed for working-class houses in Scotland it would prove an inestimable boom. While Glasgow's crusade against smoke had to some extent been interrupted by the outbreak of war, he believed it would very soon be renewed again. Certainly he for one was anxious to see what could be done in the way of purifying the atmosphere in a great industrial city like Glasgow.

The President, in the course of a felicitous reply, remarked that from the very commencement the Corporation of Glasgow had taken considerable interest in the work of the Association. The Lord Provost had recognized from the first the importance of its activities, and through all these years had been an active supporter. Personally he (Mr. Milne Watson) did hope that their meetings in Glasgow would stimulate interest in the gas undertaking—not only in that city but elsewhere in Scotland. They stood as an Association for several things. For example, they believed that however good the effect of individual effort might be—and they did not by any means underrate such an effort—that in itself was not enough. If, however, they pooled all their brains and efforts in propaganda, a great deal more would be accomplished than by individual enterprise. It was with the idea then of helping each other in this direction that the Association existed. It was very necessary that they should show a united front and carry on energetic and enlightened propaganda. This, he thought, was highly essential partly for their own sake and partly to meet the inroads and encroachments of competition. It was desirable and absolutely necessary that they should try to raise the standard of gas therms. Not only were they as an Association out to increase the sale of gas, but they were bent on educating the great mass of the people of the country as to the necessity of making the air of the great towns and cities purer than ever before. Need he add that they were out for smoke abatement and to make their dwelling houses and factories more healthy places?

Sir George E. Davies, J.P., proposed "The Corporation of Glasgow;" and Lord Provost Paxton, in the course of a brief acknowledgment, said that in Glasgow they were now working-up the whole of the bye-products of their gas-works. This enterprise was recouping them very handsomely indeed.

HYGIENE AND SMOKE ABATEMENT SESSION.

Following the luncheon, what was described as a "Hygiene and Smoke Abatement Session" was held in the Royal Technical College. This meeting was open to the general public; and it was noticed with satisfaction that many people, other than those immediately connected with the "B.C.G.A.," were present. The subject under discussion was "Gas in Relation to Hygiene and Smoke Abatement;" and as a stimulation to thought papers were read by Mr. J. W. M'Lusky and Dr. J. S. Owens.

The President said that the object of the afternoon's session was to show that the general use of gas for fuel purposes in the home would benefit the nation by improving the health of each individual citizen. In his paper, Mr. M'Lusky would deal more especially with the hygienic advantages of gas to the individual; while Dr. Owens would treat of the damage done to the health of the community by the use of coal uncarbonized. Incidentally, of course, this would lead Dr. Owens to show that gas was a very important medium for making the earth clear and pure. They wanted to see gas universally used, partly because of its effect on the purification of air. In this way, they were contributing towards the making of a healthy nation; but, again, in using gas as a nation, they would be conserving valuable coal deposits which were now being used-up. At the same time, by carbonizing this coal they would be providing extremely useful bye-products that were absolutely necessary to their success as an industry. It had been pointed out by great authorities that, as the natural resources of the world were used-up, they would have to adopt more chemical agencies for cooking food. So far as this point was concerned, he thought there was no agency which was more capable of rendering this service than the gas industry. Coal was in reality the nation's lifeblood; and because of the absence of great rivers, they must conserve their most valuable source of energy. It had been hinted that the gas industry did not take any trouble about low-temperature carbonization; but, so far as he could see, nothing was further from actual fact, because the industry was deeply interested in the question. They had to regard this matter from the commercial standpoint; and he was perfectly certain that, when the gas industry discovered it was a commercially sound proposition, it would be fully prepared to act accordingly.

The Hygiene of Gas Heating.

By John W. M'Lusky, A.M.I.M.E., the Engineer and Manager of the City of Glasgow Gas Department.

In opening, the author said that the subject of the hygiene of gas-fires has been one of the chief objects of research which has for the past ten years engaged the attention of the Association. The burning of the purified essence of coal instead of the crude article means that when the (say) 12,000 c.ft. of gas extracted from the ton of coal are burned in fire-places and kitchen stoves, instead of the 33½ lbs. of sulphur that would be discharged into the air (were this quantity of coal burned in crude form), only ½ lb. of sulphur—not more than 1½ p.ct. of the quantity originally in the coal—goes into the atmosphere; some 32½ p.ct. remains in the coke; while 66 p.ct. is converted into valuable fertilizing material to enrich our national agricultural resources. It should be added, moreover, that the small percentage of sulphur which a gas-fire discharges up its flue is only in the form of sulphur dioxide, without the addition of considerable quantities of sulphuretted hydrogen and ammonia, as is the case with the ordinary coal-fire, which also emits such noxious products as formic aldehyde and carbon monoxide—unknown in the flue gases from a gas-fire.

Observations carried out by the Coal Smoke Abatement Society show that ten years ago no less than 61,000 tons of solid matter were deposited annually from the atmosphere in the City of London; and the latest statistics of the Government's Advisory Committee on Atmospheric Pollution record a deposit for the year ended March, 1916, of about 55,000 tons, and 1920 of about 40,000 tons. A very large proportion of this deposit is wasted carbonaceous matter which has its origin mainly in the domestic coal-fire and kitchen grate. Glasgow has a proportionate deposit amounting in 1920 to about 370 tons per square mile, as regis-

tered in Richmond Park by the special instruments of the Government's Committee.

After stating the case for gaseous fuel on the side of comfort and convenience, he considered the economic aspect, and then discussed the old gas-fire and the new. Prof. Hill, he said, has constructed an instrument which is called a "comfort-meter," for indicating the condition of the atmosphere of a room in its relation to that condition which is essential to the comfort of human beings in it. This ingenious instrument entirely confirms the contention that the open gas-fire (which is, after all, only an open coal-fire burning purified instead of unpurified gas) produces and maintains a comfortable condition of atmosphere, and is a thoroughly hygienic system of artificial heating. It was because the old-fashioned gas-fire did so much of its work by convection heating at high temperature, that gas-fires got the reputation of drying the air of a room.

Then followed an interesting account of the evolution of the gas-fire from its older to its present form, in the course of which attention was drawn to various features in connection with fires exhibited. Mr. M'Lusky showed that there are many efficient and well-constructed gas-fires to be obtained to-day at a considerably lower price than the badly-designed, inefficient fires of years ago. A word of warning should, he said, be uttered regarding the cheap and nasty makeshift of the local gas-fitter—a burner put into a grate with a lot of fireclay piled upon it without any kind of arrangement in relation to the flames. Such abortions, with their incomplete combustion and waste of heat up the chimney, are true examples of the false economy of mere cheapness. All the improvements made, which mark an enormous advance in gas-fire construction, have resulted in a rapid increase in the adoption of gas heating by the cultured public. But they would have been largely discounted if great improvement had not also taken place in the skill and care with which gas-fires are installed and subsequently looked after.

It is difficult in these enlightened days to understand how the hygienic efficiency of the modern gas-fire can be questioned, especially when its form of heating is so universally in use in all our large towns all over the country; but we shall be wise to face facts when we meet them, and there is no doubt that there are still serious-minded people who question the hygienic efficiency of the gas-fire. This being so, we should not be serving our case by brushing aside such criticism as ignorance, but should use every endeavour to show facts and figures to demonstrate quite clearly that there is no foundation for these doubts, and, on the other hand, show that not only is the modern gas-fire not deleterious to health, but that it is a decisive factor in improving the conditions of life which make for health, by reducing the smoke nuisance and improving the ventilation of the rooms in which it is fitted.

One large gas undertaking, recognizing the influence the doctor held in relation to the home, obtained statistics of the proportion of doctors on its area of supply using gas-fires. The total number of doctors under review was 4281, and the last record is 1914-15. The war then made it impossible to continue obtaining these useful figures. At this period, of these 4281 doctors, 3350—which represents 78 p.ct. of the whole—were known to be using gas-fires. Of the other 22 p.ct., many had been using gas-fires without the knowledge of the gas undertaking. The area under review included Harley Street and Wimpole Street, the homes of our great physicians and surgeons. The total number of fires in use by these doctors was 8455, or nearly three fires in each house.

I have heard it said, "Oh yes, doctors have gas-fires in their consulting rooms for convenience; but they would not dream of using them in the residential portion of their houses." We have many examples where individual doctors have as many as ten fires in the residential portion of the house—showing quite conclusively that they have satisfied themselves that the gas-fire is undoubtedly hygienically perfect; otherwise they would certainly not have installed a system of heating on which they entertained any doubts, in their own homes—of all places. In Glasgow, we supply fires to more than 500 doctors; and one medical practitioner is a great enthusiast, in that he has twelve fires in his house.

Such London hospitals as the Westminster and the Samaritan are using gas-fires exclusively for heating; and in St. Thomas's, St. Bartholomew's, and, in fact, all the other hospitals, gas takes a very prominent part in the general heating of the building. At one of these hospitals over 300 gas-heating stoves have been fixed. Would the hospital authorities, with every opportunity of testing the hygienic efficiency of the gas-fire, make such universal use of this labour-saving, health-giving, and clean method of heating, if they had not first satisfied themselves that the modern gas-fire stood for efficiency, and when properly fixed was undoubtedly an asset to health, instead of a detriment? No, the modern gas-fire is hygienically perfect, and can be safely installed in the hospital ward and the home; the only ill-effect being felt by the coal merchant and the house decorator—the one by his loss of custom; the other through his loss of work resultant on a clean heating agent in place of the dirt from the use of solid fuel.

The Prevention of Smoke Pollution.

By Dr. J. S. Owens, A.M.Inst.C.E., F.G.S., Superintendent of the Advisory Committee on Atmospheric Pollution.

The necessity for preventing the pollution of the air which they had to breathe by smoke was fortunately receiving wider recognition of recent years. The time was doubtless very near when it would be regarded as an offence against public health to pollute the air, in the same sense as it was now an offence to pollute drinking water. The question was not one for the consideration of manufacturers, factory owners, and others who were responsible for the production of smoke, so much as for the community in general, who were forced to consume it in the air they breathed. What really concerned him was that the extended use of gas for such purposes as heating and cooking was, in fact, bringing about a reduction in the degree of pollution of the air by smoke. He did not propose to enter into the financial aspect of the question. There was only one solution for the domestic smoke problem, and that was the burning of smokeless fuel. Of all domestic fires, the kitchen range, burning ordinary house coal, was one of the worst offenders. Indeed, he would go so far as to say that, in his opinion, the consumption of smoky fuel in a kitchen range should now be absolutely prohibited. While there was room for differences of opinion as to the relative merits of different fuel for ordinary domestic heating, he thought there was little doubt that, for cooking purposes, gas offered the best and most economical solution of the smoke problem. He would therefore summarize his remarks in this connection by saying that he thought the time was now ripe when smoke, beyond a certain small and specified quantity, from factory furnaces should be made illegal; and that a similar step should be taken in connection with the use of smoky coal in kitchen ranges. Neither of these steps would inflict serious hardship upon the community; but they would go a long way to purify the atmosphere from smoke.

As most of the members of the conference were aware, he had for some years been actively interested in an investigation into the effect of smoke on the atmosphere. This investigation was started so as to provide accurate data where none were available; and it was now being carried out by the Advisory Committee on Atmospheric Pollution to the Meteorological Office. He then went on to explain what the Committee are doing [a matter which was referred to in our editorial columns, on p. 480 of the issue dated Aug. 31], and concluded by alluding to the remarkable effect upon atmospheric purity which was observed in so many large cities during the coal miners' strike. The mines closed on April 1, and re-opened on July 4. After a lapse of about three weeks, giving time for stocks of coal to be used-up, the effect of the strike upon the atmosphere became apparent.

DISCUSSION.

Mr. W. J. Sandeman (Croydon), moving a vote of thanks to the authors, said that the importance of Mr. M'Lusky's paper could not be too strongly emphasized. In Croydon they made a point of seeing each gas-fire every year; and he considered that a policy of this kind was absolutely essential, if they were to popularize the use of gas. He could not help noticing the remark made by Dr. Owens in the course of his paper, that kitchen ranges were some of the principal offenders in regard to the smoke nuisance. Frankly, he agreed with this assertion.

Mr. Robert Watson (Doncaster) seconded. He said that Dr. Owens was an acknowledged authority on the subject of air purification. Accordingly, the delegates attending this year's conference must have felt privileged in hearing him, and in seeing the excellent and expressive diagrams he had thrown on the screen. There was not the slightest doubt that those of them who lived in industrial centres had enjoyed what he might characterize as an extraordinary experience this year. In Yorkshire, during the coal strike, it had been possible to see large industrial cities under conditions of sunshine that at one time were regarded as altogether incredible. What had been ocularly demonstrated during the year made such a paper as Dr. Owens had given them of infinitely greater value and significance to them all.

Councillor W. B. Smith (Glasgow) said he had been associated with Dr. Owens since 1912. While it was quite true to say that the gauge for measuring impurities deposited on the earth from the air was the joint design of all the members of the Advisory Committee on Atmospheric Pollution, it was equally true that the second ingenious instrument for thoroughly measuring impurities floating about or suspended in the atmosphere was entirely the creation of Dr. Owens's mind. No fewer than nine of these gauges had been installed in Glasgow. The gauges had disclosed the somewhat astonishing piece of information that the warehouses, shops, offices, and dwelling-houses in the area known as Blythswood Square were throwing into the air far more smoke than did industrial districts in Glasgow like Parkhead, Tollcross, and Govan. Mr. M'Lusky had shown how this problem could be solved.

Mr. H. M. Thornton (London) said Mr. M'Lusky's paper had performed a great service to the gas industry. His review of the many advantages to be gained by using gas-grates, both from the domestic and the national point of view, deserved to be widely read. The part of his address devoted to the development in the construction of gas-grates from comparatively a few years ago to the present time was of extraordinary interest—showing, as it must do to all interested in the subject, that manufacturers of gas apparatus had given a great deal of time and consideration, by the aid of their chemists and laboratories, to research work towards the perfecting and standardization of gas-grates. A gas-grate to-day, as Mr. M'Lusky pointed out, was perfectly hygienic—no products of combustion escaped into the room when it was correctly fixed. The proper ventilation of rooms was assured with the present-day construction of gas-grates, while the curve of the front gave to all parts of a room an equal distribution of radiant heat. Mr. M'Lusky showed a lantern slide of a gas-grate with adjustable flue outlet. This had been found to be of great service in dealing with the variable height of coal grate canopies. It was quite possible that gas engineers might wonder if the present-day gas-grate had reached finality in constructional details. He (Mr. Thornton) thought

the answer was "Yes," for many years to come. This opinion might be of special interest in view of the President's announcement that day that the Gas Light and Coke Company had commenced to simple-hire gas apparatus, and other undertakings had also decided to do so. They ought to continue the good work that had been done by the Association in advertising, and to make it clear to the public, as well as to architects, builders, and others, that a gas-fire was not a makeshift which might be introduced in place of a coal-fire, but that it could be, and ought to be, a permanent part of the modern home. In any advertising that the Association undertook, they should set their face against trying to mislead the public. From inception, no charge of this kind could be laid at the door of the "B.C.G.A.;" but he was induced to offer these comments on advertising because of claims that were being urged in advertisements on behalf of a certain apparatus. He was rather sorry that up to the present time these claims had not been refuted; but he was now aware that the attention of the Chairman of the Executive had been drawn to the matter. Touching on the scope of advertising, Mr. Thornton mentioned that in his own offices in London—thanks to the kindness of the Gas Light and Coke Company—they had a very interesting exhibit of the residuals which were obtained from gas making. If members could realize the astonishment with which visitors saw these wonderful products of the gas-manufacturing industry, they would be prepared to go in more extensively than ever for this kind of advertising.

Councillor J. W. SUTTON (Manchester) mentioned the fact that he came from a district where, during the progress of the recent miners' strike, they had been able to grow flowers out of doors for the first time in 25 years.

Mr. F. W. GOODENOUGH said he wanted to speak for a moment or two on the point raised by Mr. Thornton. It was the case, as Mr. Thornton had hinted, that advertisements were appearing explaining that there were certain types of gas-heating apparatus that could be used in any room without a flue. The gas industry wished to assure the public most definitely that it was not right to use any gas apparatus in a bedroom, or small living room, without a flue. When the "Lancet" did so much to advance the cause of gas heating by the publication of its report—giving as it did a clean bill of health to gas—it expressly qualified the statement by making plain that a gas-fire should be properly constructed and fitted with a flue. There was no more sense in fitting a gas-heating appliance in a room without a flue, than in building a fire in a room without a chimney. Accordingly, he hoped that those who were making statements in regard to any particular type of gas apparatus would very shortly modify their claims. Personally, he felt sure they were advancing their claims without realizing the risk to the public health.

The session was brought to a close with the customary votes of thanks.

Reception and Lecture by Dr. C. W. Saleeby.

On Tuesday evening, the members of the Association and their lady friends were entertained to a reception by the Lord Provost, Magistrates, and Town Council of the City of Glasgow. A feature of the gathering, which was numerously attended, was the illustrated lecture given by Dr. C. W. Saleeby, F.R.S. (Edin.), on "Life and Light."

Lord Provost Paxton and the Corporation Magistrates received the guests in the Satinwood Saloon, and subsequently an adjournment was made to the Banqueting Hall, where the lecture was delivered.

Dr. SALEEBY, who had a very cordial reception, claimed that the darkening of the sky in urban centres of civilization, especially in winter, was the foremost of our offences against the laws of life and health. To his mind, the scourge of tuberculosis, which was so prevalent in our cities, was nothing short of a scandal. In the presence of sunlight this was a disease which could not, and should not, exist. Again and again it had been conclusively demonstrated that even the most desperate cases, upon which surgeons had done their best or their worst, were capable of yielding in a reciprocal way to sunlight. Even when the victims were on their way to the grave, sunlight had been known to give health and happiness. The lecturer illustrated his strong and pronounced views by a remarkable series of lantern slides. These pictures, Dr. Saleeby explained, had been supplied to him by Dr. Leysin, of Switzerland, who for many years had been curing people whom nobody else could cure. These results, which many of the patients themselves believed to be nothing short of miraculous, were brought about simply and solely by means of sunshine. Astonishing results, such as these gained in Switzerland, opened up a new vista of thought as to whether we were on right lines in our methods of combating tuberculosis, and whether it was not now time to get back to first principles and to make the cities consonant with the simple laws of life. He noticed that in a letter recently appearing in the columns of a London newspaper objection had been taken to the fact that the Ministry of Health had not insisted on the new houses they were building being equipped with electricity. So far as this criticism was concerned, what he had to say was that if we had a Niagara at the nation's disposal in all parts of the British Isles, which would enable them to arrange for the production of electricity, the idea might be quite an acceptable one. Unfortunately, in the British Isles they had not a Niagara at their disposal. Then it was generally well known that coal for the production of electricity was intensely uneconomical. Faced with these known facts, he had no hesitation in recommending the utilization of all available waterfalls; but, over and above this, he was going to suggest that the only economic way of using coal was to distil it—leaving gas and coke for the production of energy. Finally, he was fully convinced that the campaign for the use of forms of fuel which did not obstruct air and light was the most important of all the campaigns now being waged for the salvation of the race.

The thanks of the guests were conveyed to Dr. Saleeby, in felicitous terms, by the President.

Apart from the lecture, which was intensely interesting and instructive, a programme of enjoyable music was gone through.

WEDNESDAY'S PROCEEDINGS.

THE INDUSTRIAL ECONOMY SESSION.

The proceedings on Wednesday opened with an Industrial Economy Session, which was held in the Royal Technical College, Glasgow, and which members of the general public as well as visitors were privileged to attend. The main subject for discussion was "Industrial Uses of Coal Gas;" and in the course of the session the following papers were read: "Gaseous Fuel in the Shipbuilding World," by Mr. George Keillor, the Engineer and Manager of the Greenock Corporation Gas Department; "A Thousand and One Uses for Gas," by Mr. Samuel Milne, the Engineer and Manager of the Aberdeen Corporation Gas Department; and "Production, Distribution, and Uses of Gas Coke," by Mr. E. W. L. Nicol, the Fuel Expert and Engineer to the London Coke Committee.

The PRESIDENT, in the course of a few introductory observations at the forenoon session, said that on the previous day they had considered how gas could benefit the individual with special regard to industrial appliances. To-day, however, they proposed to inquire how gas could be utilized for their factories and industries. In the course of their deliberations the preceding day, it had been proved to general satisfaction that smoke pollution in the large towns and cities was largely due to the domestic open coal fire. At the same time it was well to remember that the chimneys of the great factories and workshops also added a large quantity to the smoke which befogged towns and cities. In this connection it was the desire of the Association to show that, by the use of smokeless fuel (either gas or coke), this great evil could be mitigated. The real object then of their special session this forenoon was to discuss the question of the mitigation of the smoke nuisance arising from factories and workshops. Of course, there was really no use in suggesting the general utilization of smokeless fuel unless they could show that it was an economical process. In these difficult days, manufacturers were seeking economy in every direction; and the Association wanted to point out to such manufacturers that by adopting smokeless fuel they would not only be doing good work towards smoke abatement, but they would benefit their own pockets, which was probably the strongest possible appeal that could be made.

The Model Gas Bill—Important Concession.

The PRESIDENT said that before calling for a general discussion on the papers to be read this forenoon he was desirous of intimating that he had received a message notifying him that the Lord Chairman of Committees of the House of Lords had agreed to delete from the Model Gas Bill the clause now appearing in it which prohibited local authorities from dealing in gas-fittings, &c. In future, local authorities would have absolute freedom in this matter.

Gaseous Fuel in the Shipbuilding World.

By GEORGE KEILLOR, Engineer and Manager of the Greenock Corporation Gas Department.

In opening, the author pointed out that the paper did not deal with the actual use of town's gas in British shipyards, for the simple reason that in this country little or no gas is used in the work of steel ship construction. Therefore his facts had to be based upon the success attending the application of such gas in other industrial fields, and upon the wonderful success following its introduction into American shipyards. Have we not, he asked, proved in Glasgow and elsewhere that heavy forgings can be produced 51 p.ct. cheaper with gas than with solid fuel, while yielding a net increase of fully 10 p.ct. in output? And have we not proved that even better results are obtainable from modern gas rivet-heating and other furnaces? In Glasgow, Greenock, Darlington, and elsewhere, the engineering and boiler-making industries are daily proving that gas rivet-heating is costing less than one-half that of solid fuel. If, therefore, the simple process of gas rivet-heating is being successfully applied outside the shipyard, what is there to prevent its being even more successfully applied inside the shipyard, where the process of riveting enters so largely into the cost of construction? In our opinion, there is nothing to prevent it; but perhaps the shipbuilding industry has good reason for its conservatism. If so, we should be glad to be in possession of its objections, in order that they may be examined and a reasoned answer given. Real progress would then be sure to follow. Meantime there is none.

About three years ago, Messrs. Crabtree and Co., River Yare, Southtown, Great Yarmouth, introduced with excellent results gas-fired furnaces for their heavy work, and Mr. Keillor understands it is their intention to extend the system; but personally he knows of no shipyard in Great Britain where town's gas has been given a real try-out with a view to proving its all-round use-

fulness and efficiency. Paradoxical as it may seem, however, he does know that on the Clyde, and within recent months, solid-fuel furnaces have actually been supplanted by oil-fuel furnaces, after overseas competitors, using oil at the low price of 6s. 8d. per barrel, have proved following a searching investigation that it paid to scrap all oil plant and introduce town's gas for every operation requiring heat treatment.

The author quoted the experience of the Moore Shipbuilding Company, of San Francisco, to prove to shipbuilders that the application of town's gas to their industry is a great aid to economic production. Mr. Letson Balliet, of that Company, has given an analysis of the causes of waste and high costs in riveting as carried on in shipyards, and shows conclusively that one of the largest factors in the elimination of this waste and the reduction of costs is the proper selection and skilful use of fuel for the heating of rivets. Summarizing the results of his investigations, and taking into consideration all the elements which enter into riveting costs, Mr. Balliet shows that the comparative costs per forge per eight-hour shift are:

Oil-fuel rivet heater	$13·98
Coke-fuel rivet heater	7·75
Gas-fuel rivet heater	1·85

These figures are taken from the actual results of tests on fifteen stationary rivet-heating furnaces.

Again, Mr. J. J. Mulgrave, of the Pacific Gas and Electric Company, has shown that American shipbuilders are keenly alive to the economies of town's gas. The ease of handling gas and its directness have proved large labour-saving factors. Its cleanliness is not only a saving of labour, but has direct effect in making a better product. There is less scaling and burning of the iron and steel. Six million c.ft. of gas enter into the construction of each vessel of average size. The author was able to give, through the courtesy of Mr. Mulgrave, a large number of test figures.

ANNEALING.

With regard to annealing, figures were given in the paper relating to the heat treatment of grey iron castings in a "Revergen" furnace, representing actual workshop results obtained under ordinary commercial conditions, with the furnace in charge of unskilled workmen. The castings treated were very light in section, and showed a pronounced tendency to chill. As they constituted parts of a highly specialized and complicated machine, and as each casting had to be subjected to delicate and accurate machining on specialized mass-production plant, efficient heat treatment was a matter of extreme importance. The heat treatment to which the castings were subjected comprised the raising of the charge in the furnace to a temperature of 850° C., and maintaining this temperature, to ensure a thorough soaking, for about 3½ hours. The time during which the charges were actually in the furnace varied from 5½ to 6 hours; the average being approximately 5 hours 40 minutes. A table gave the results of thirteen consecutive heats; the furnace being started from cold in the first instance. At various periods during the heat treatment of the castings, it was necessary to allow a certain amount of time to elapse between charges; the blowing plant during these intervals being used for other purposes. Thus the actual time the thirteen charges were in the furnace was 74½ hours. The time lost between the charges amounted to 18 hours; the total duration, from the start to the finish of the operations, being therefore 92½ hours. The gas consumption recorded represented the total used from beginning to end, and included any losses due to periods of waiting and to recovering heat lost during the charging and discharging of the furnace—being, in fact, the gas consumed to complete the whole operation.

The economy attending the employment of the "Revergen" furnace would, Mr. Keillor said, be manifest from the fact (revealed by the table, that the gas consumed for all the operations performed worked out at only 4030 c.ft. per ton, or 1·8 c.ft. per lb., of charge raised to 850° C., and maintained at this temperature for from 3 to 3½ hours; and when other advantages of the "Revergen" principle—such as the savings in labour and space—are also taken into consideration, the all-round economy of the "Revergen" furnace will be strikingly apparent. As compared with coal-fired furnaces, the "Revergen" principle ensures greater accuracy in control, superior speed in raising the charges to the desired temperature, and precise accuracy in the adjustment of the rate of heat-generation to maintain the temperature without fluctuation.

HARDENING AND NORMALIZING.

Another table giving the results of twelve hours' work carried out in a "Revergen" furnace at Luton, on the normalizing of mixed steel castings in a furnace 54 in. by 32 in. by 24 in., showed that the average gas consumption, including heating-up figures, was 1·83 c.ft. per lb. of metal heated.

The following billet-heating test of the "Revergen" oven furnace (demonstrating conclusively both the economy of the furnace and its thorough suitability for billet heating) was arranged to enable the supervising Ministry of Munitions official to place before the competent authorities concrete evidence of the superiority of the "Revergen" oven furnace as a billet heater for installation against all competitors in a new and important national gun factory. The whole of the operations were carried out under the direct instructions of the Government representative, who took and recorded all observations, temperatures, gas consumptions, &c.; the latter being checked by an independent and authoritative witness, present to satisfy himself that the "Revergen" oven furnace was the best to be obtained for his own similar requirements. The furnace used was a 4 ft. 6 in. by 3 ft. by 2 ft. oven; and the test required that the oven should be brought to a pre-determined temperature (820° C.), and loaded-up with cold billets, the whole being then brought back to the same temperature, and being so maintained for one hour. The subjoined are the duly certified results:

Gas consumption per lb. of billet to raise charge to 820° C..	1·3 c.ft.
Gas consumption per lb. of billet to maintain charge at 820° C. for one hour	0·341 ,,

CASE-HARDENING.

In a 54 in. by 32 in. by 23 in. "Revergen" oven furnace, the required temperature of 900° C. for case-hardening was obtained in 70 minutes from lighting-up. The over-all gas consumption for a run of 9 hours 10 minutes was only 4·8 c.ft. per lb. of load.

BILLET HEATING.

There can be no doubt that the ideal way to purchase fuel is in gaseous form; but the average engineer has always looked askance at the idea of utilizing town's gas in connection with the larger heating problems—*e.g.*, plate-heating, billet-heating, and frame-heating—mainly on account of what he has considered the prohibitive initial cost of the gas. It is, however, perfectly obvious that, if the very high thermal content of the gas could be fully taken advantage of—that is, that a high-efficiency furnace be employed—a totally different aspect would be placed on the matter. The earlier gas-furnaces attained an efficiency of round about 18 p.ct.; but now town's gas fired furnaces are available which can give an efficiency in these operations of over 41 p.ct.

The introduction of the "Revergen" principle of heating not only brought the production of heavy forgings in furnaces fired by town's gas (which, from a commercial point of view, had hitherto failed to compare favourably with coal-fired furnaces for this class of work) within the scope of practical industrial operations, but also raised town's gas to the position of the most efficient fuel for the purpose.

TABLE I.

Forgings made.	65 cwt.	Coal used.	9 tons at 39s.
Labour	18 hours at 1s. 1d. and 24 hours at 1s. 6d.		
Gross cost			£20 6s. 6d.
Cost per ton forgings produced			£6 5s. 1d.

TABLE II.

Forgings made.	75 cwt.	Gas used	56,000 c.ft. at 3s. 9d.
Labour			7 hours at 1s. 6d.
Gross cost			£11
Cost per ton forgings produced			£3 1s. 3d.

Tables Nos. I. and II. show the remarkable economies which actual tests under ordinary working conditions have proved to be effected by a "Revergen" in comparison with a coal-fired furnace. The figures relate to a representative week's cost of the production of heavy forgings for marine engines by a coal-fired furnace, including the cost of the labour entailed in firing the furnace and in conveying supplies of coal to, and ash residue away from, the furnace, in comparison with the cost of a similar operation in a "Revergen" carried out (shortly after the latter had been handed over to the users) by men with no experience whatever in the handling of gas-fired furnaces, and no specialized knowledge of the subject beyond that gained in one day's tuition from the furnace builders—the "Revergen" operations being conducted without any reference to, or assistance from, the builders of the furnace. As will be seen from the tables, the "Revergen" furnace achieved a remarkable economy of no less than 50 p.ct. in the cost per ton of forgings produced.

Remarkable as are the figures quoted, the working results of the "Revergen" furnace were substantially improved when the men became more accustomed to handling the furnace; and the figures given in Tables III. and IV. were taken some weeks later than those in Tables I. and II. It will be borne in mind that the process of producing the articles in question is such as to necessitate the passing of each one through the furnace a number of times. The "gross cost per ton" of forgings produced represents, in each instance, the total cost per ton of the finished articles, and covers the gas consumption and all the labour employed in the production of the forgings.

TABLE III.

Work Done.	No.	Weight Each.	Net Weight of Forgings.	Times Heated.	Gross Weight of Metal Through Furnace.
		Lbs.	Cwt. Qr. Lb.		Cwt. Qr. Lb.
Eccentric rods .	6	1082	58 0 0	3	174 0 0
Valve spindles .	7	1064	66 2 0	3	199 2 0
..	..	..	124 2 0	..	..

Gas used . . . . 60,570 c.ft. Labour . . . . 10s. 6d.
Gross cost per ton forgings. . . . . £1 18s. 2d.
70 p.ct. economy over coal.

TABLE IV.

Work Done.	No.	Weight of Each.	Net Weight of Forgings.	Times Heated.	Gross Weight of Metal Through Furnace.
		Lbs.	Cwt. Qr. Lb.		Cwt. Qr. Lb.
Quadrants . .	6	266·0	14 1 0	6	85 2 0
Main bearing bolts . . .	26	196 0	45 2 0	3	136 2 0
..	..	..	59 3 0	..	..

Gas used . . . 27,070 c.ft. Labour . . . . 10s. 6d.
Gross cost per ton forgings . . . . . £1 17s. 6d.
70 p.ct. economy over coal.

In addition to the savings in cost indicated by the figures quoted in the four tables, the "Revergen" principle permits of a greater output from the forging machinery than it is possible to obtain by means of a coal-fired furnace; while the absence of steam, smoke, and cinder enables vast improvements to be effected within the smithy. Moreover, considerable saving of space, both in the smithy and outside, is to be effected by the substitution for a coal-fired furnace of a furnace fired on the "Revergen" principle.

PLATE HEATING.

With regard to plate heating, a report on work done in a "Revergen" furnace 8 ft. by 6 ft. 3 in. by 18 in. on heating plates, 5 ft. 10 in. by $\frac{7}{8}$ in., to 1050° C., for pressing, gave these figures:

Total gas used	14,850 c.ft.
Total weight of metal heated	6,678 lbs.
Average gas used per lb. of metal heated . .	2·2 c.ft.
Average weight of plates	954 lbs.

RIVET HEATING.

Test of Rivet-Heating Furnace, Fitted with Two A.B. Burners.

Approximate temperature of rivets drawn, 1000° C.

The rivets used in the test given below were mixed rivets, ranging from 2¾ in. long by ¾ in. diameter, to 6 in. long by ⅞ in. diameter, and weighed 205 lbs. for 311 rivets.

Started from cold. First rivet out in five minutes.

Time.	Consumption.	Weight.	Remarks.
11.0 a.m.	..	..	..
11.5 ,,	..	..	1st rivet out
11.30 ,,	165 c.ft.	72 lbs.	..
12.0 p.m.	135 ,,	92 ,,	..
12.30 ,,	205 ,,	145 ,,	..
1.0 ,,	185 ,,	131 ,,	..
1.30 ,,	175 ,,	128 ,,	..
2.0 ,,	160 ,,	130 ,,	..
3.0 ,,	300 ,,	259 ,,	Furnace loaded with rivets

Total gas . . . 1325 c.ft. Total weight . . 957 lbs.
Time . . . . 4 hours. 1·384 c.ft. per lb.

The first interesting point is that rivet No. 1 came out in five minutes from lighting-up, and that one hour from starting-up from cold 92 lbs. of rivets had been withdrawn. The rate of discharge is then clearly shown. The temperature of the rivets drawn would probably not be quite sufficient for hand riveting, but would be considerably in excess of the temperature required for the hydraulic rivet heater. The furnace in question is very small, compact, and a quite portable apparatus.

Rivet-Heating Test on New Pattern Rivet Heater Fitted with Air-Blast Burner.

Size of rivets: 4¾ in. by 1¼ in., 4¼ in. by 1¼ in., 6 in. by ¾ in., 5 in. by ¾ in., 3¾ in. by ⅞ in., 3¼ in. by ¾ in.

Working temperature of rivets drawn, 1200° C.

Time.	Remarks.	Weight Out. Cwt.	Qrs.	Lbs.
10.10	Furnace loaded and lit up . . .	..		
10.22	First rivet out	..		
11.10	..	0	3	0
12.10	..	1	0	2½
12.40	..	0	2	25
1.45	Furnace lit up	..		
1.55	First rivet out	..		
2.45	..	1	0	2¾
3.45	..	1	1	10
4.15	..	0	3	6½

Total weight of rivets heated, 634¾ lbs.
Total gas consumption, 1825 c.ft. = 2·875 c.ft. per lb. of metal heated.

NUT AND BOLT FORGING.

Details of working tests on a "Revergen" forging furnace, double sided, with seventeen holes in each side, heating bars 6 in. to 7 in. in length and about 1⅛ in. diameter, to 1300° C., gave a gas consumption of 3·227 c.ft. per lb. of bars heated.

CORE AND MOULD DRYING.

All who are in any way connected with foundry work will be interested in a new plant for drying cores and moulds. It has been introduced to supersede coke firing; and town or producer gas is the usual heating medium. The experimental work was carried out in Greenock, in an oven 8 ft. by 15 ft. 6 in. by 21 ft. 6 in., with excellent results. The plant is self-contained, easily regulated, and can be applied to existing stoves. Its application reduces labour charges, gives a steady drying effect, and allows the stove temperature to be easily adjusted to the required degree. Briefly, the plant in question consists of a small high-pressure blower, gas-injector, burner-head, and Keith-Blackman automatic mixture-control governor, combustion chamber, and the requisite arrangements for exhausting and re-circulating the products of combustion. The equipment for each drying stove is complete in itself, except with regard to the blower, one of which, with the necessary air-pipe connections, may be used to serve a number of stoves.

The blower delivers the requisite quantity of fresh air to the gas-injector at a pressure suitable for inducing the required amount of gas. Before the gas reaches the injector, it passes through a "K.B." automatic mixture-control governor—a device which automatically maintains the correct proportions of gas and air for proper combustion, irrespective of changes that may take place in the air pressure, gas pressure, or both, or in the resistance of the stove. After mixing in the injector, the gas and air pass into the combustion chamber, situated inside or outside the stove, and combustion takes place at the burner-head, which is a cup-like casting with external ribs or fins.

The combustion chamber itself may be of asbestos-lined sheet steel, or of brickwork; and it is provided with a large mica-covered inspection and lighting door, through which access to the burner is easily obtained. A small bye-pass with cock is provided, whereby a small jet can be kept lighted just below the burner-head when the plant is not working.

After combustion, the hot gases are delivered to the stove at the back (or at one side, where the stove has doors at each end), pass across the cores and moulds, and finally reach the exhaust uptakes; the inlets being near floor-level. These uptakes rise to ceiling-level, and then join together at the throat of the re-circulating injector, which, in turn, communicates with the combustion chamber. This re-circulation is a special feature of the system, and is produced by means of a high-speed jet of air (or in certain cases of the products of combustion themselves) issuing from the blast-nozzle of the re-circulating injector.

The products so returned do not interfere with the combustion of the newly-admitted air and gas as they pass along the annular spaces between the burner-head and the walls of the combustion chamber; but an intimate mixture with the newly-burned gas is formed on the far side of the burner-head, just before the products are again discharged into the stove. Practically the whole of the exhaust gases are re-circulated, although a small percentage is released to the atmosphere to compensate for the fresh air and gas delivered to the combustion chamber. Convenient openings near the floor-level, or other suitable arrangements for passing away the surplus products, can be made.

Ordinarily, a stove temperature of 230° C. (450° Fahr.) to 260° C. (500° Fahr.) is maintained; but temperatures considerably higher than 260° C. can be obtained if required; and, as the temperature is under perfect control, it is an easy matter to start-up at a lower temperature and warm-up to the desired maximum at the required rate.

Some of the advantages claimed for this method of drying are as follows:

1.—Simplicity of application and control.
2.—Rapid warming-up of the stove to the required degree.
3.—Rapidity and thoroughness of drying, due to the re-circulation of the products of combustion; the minimum only being allowed to escape.
4.—Cleanliness.
5.—Reduction of labour charges in stoking, cartage, and storage of fuel, and cartage of refuse.
6.—Uniformity in drying.
7.—No cracking of cores and moulds.
8.—Percentage of faulty castings reduced, due to the more perfect drying of cores and moulds.
9.—Clean castings produced, saving time and labour in the fettling shop.

This system is applicable to almost any drying process; and Messrs. James Keith and Blackman Company, Ltd., of London, will give further information to interested parties. This system is being applied to bread-baking ovens in Greenock. [Illustrations will be found in the "JOURNAL" for March 9 last, p. 621.]

FUEL CONSUMPTIONS FOR VARIOUS OPERATIONS.

Referring to the gas consumptions involved in the various operations mentioned, it is very difficult to set out true comparisons of gas and solid fuel firing, as conditions vary in the different works. However, the consumptions given in the following comparative tables may be taken as for average conditions, and using gas of a calorific value of 450 B.Th.U. net.

After a close study of the heat-treatment jobs in a shipyard, and with a full knowledge of the potentiality of town's gas as applied to industry, Mr. Keillor is convinced that in a very few years coal, coke, and oil fuel will have been supplanted by gas. When that time arrives, it will be found that, wherever a compressed air pipe-line exists, there will also be found a low-pressure gas-pipe line suitably tapped and provided with flexible coupling tubes, so that rivet heating and ancillary operations requiring the application of heat may be speedily and economically accomplished in and about any part of a ship or building yard. Or

TABLES SHOWING APPROXIMATE CONSUMPTION OF FUEL FOR THE VARIOUS OPERATIONS WHEN FURNACES ARE GIVING MAXIMUM OUTPUT.

TABLE I.—*Town's Gas Firing.*

Operation.	Ordinary Oven Furnace.	Recuperative or Regenerative Oven Furnace.
Hardening	8,000 c.ft. per ton	3–4000 c.ft. per ton
Annealing	8,000 " "	3–4000 " "
Tempering	4,500 " "	"
Normalizing	4,500 " "	"
Rivet heating	3 " per lb.	"
Billet heating (950° C.)	7,000 " per ton	3–4000 c.ft. per ton
" " (1200° C.)	8,000 " "	4–5000 " "
Forging	3 " per lb.	"
Plate heating for bending	8,000 " per ton	4–5000 c.ft. per ton
Melting aluminium	9,000 " "	"
" brass	9,000 " "	"
" cast-iron	12 " per lb.	"
" copper	9,000 " per ton	"
" cupro-nickel	9 " per lb.	"
" delta-metal	9,000 " per ton	"
" gunmetal	10,000 " "	"
" lead, tin, brazing metal	0·75 " per lb.	"
" phosphor bronze	9,000 " per ton	"

TABLE II.—*Producer Gas Firing.*

Operation.	Fuel Ratio—Gas-Coke Metal.
Annealing	7 p.ct.
Hardening	7 "
Plate heating for bending	12 "
Billet heating (1160)	12½ "
Forging (heavy)	12½ "

better still, each shipyard should be equipped with suitable gas compressing and mixing plant for the distribution of high-pressure gas, or an air-gas mixture to furnaces, lighting standards, &c.

Where difficulty is experienced with gas-fired furnaces in maintaining an equably proportioned mixture of gas and air, due to variations in the pressure on both gas and air mains, the introduction of a Keith-Blackman automatic mixture control overcomes all difficulties. The controller allows for all variations in gas and air pressure, and for variations in the furnace resistance due to temperature, load, &c. Other systems worthy of mention in connection with the mixing of gas and air for furnace work are those invented by the Selas-Turner Company, Ltd., of Manchester, and the "Docking" system by Messrs. Sharp and Preston, Ltd., of Dublin. This method is used in American shipyards, &c., and ensures the mixture of air and gas always being correctly proportioned; and, when consumed in specially-designed burners, excellent results are obtained.

The paper was accompanied by a large number of photographs, many of which (showing the application of gas to different industrial processes) were supplied by the Sunderland Gas Company.

A Thousand-and-One Uses for Gas.

By SAMUEL MILNE, the Engineer and Manager of the Aberdeen Corporation Gas Department.

In connection with this paper, a number of lantern slides were shown depicting a few of the practical manufacturing processes in which gas is being utilized. Some of the appliances were on view in the meeting hall; and a working demonstration of furnaces had been arranged by the Glasgow Corporation at Milan Street. The author said that even those most in touch with developments might be astonished to know that in 2700 separate trades in this country there are now nearly 400 different processes in which gas is employed. Also, to-day gas still holds the record of being the chief form of illuminant in the country. It is perfectly true that electricity is making rapid strides in this direction; but it is equally true that, while electricity is developing, gas is also doing so. He quoted various authorities to show the advantages of gas for both domestic and industrial purposes.

Time, he said, would not permit of so much as mentioning all the various uses to which gas can, and is, being applied. It plays a part in almost everything we touch in our everyday life—in the erection of our houses, in the manufacture of the clothes and of the boots we wear, in the food we eat, in our articles of furniture, and the cutlery and crockery upon our tables. It is also used in the construction of our tram cars and motor cars. It even enters into our recreations—into the making of our golf clubs, balls, tennis rackets, and many other articles. In our amusements at the theatre and the cinema, where power is used to produce the electric arc, the heating and ventilation is effected by gas. An interesting fact, proving the wonderful strides which coal gas has made in the equipment of an up-to-date factory, recently came to his notice. One gas company who had commenced a regular canvassing campaign to popularize gaseous heating, actually sold during the first nine months of the campaign over £10,000 worth of furnaces, &c., the estimated consumption of which, based on a conservative figure of 600 hours' use of each appliance per annum, was equal to the total amount of gas sold for a year in a town the size of Dunoon.

Coming to another branch of his subject, Mr. Milne said that the following points made clear the advantages which gas power would confer on any user who required motive power quickly or intermittently:

1.—First cost is considerably less than that of a steam unit, and little (if any) greater than that of an electric motor.
2.—A small gas-engine requires no more outside help to start it than does a motor, and is started about as quickly.
3.—It requires little skilled labour or technical knowledge to run it.
4.—Running costs are approximately 30 p.ct. less than electric power and 50 p.ct. less than steam.
5.—Maintenance charges are low.
6.—Its life is equal to that of a steam unit or of an electric motor.
7.—There is no danger from fused wires, no risk to the attendant, no chance of setting fire to property—hence insurance is easier, and official inspection obviated.
8.—There is much more elasticity in a gas-engine. In the event of an overload, the engine would merely be pulled up. An electric motor would in all probability be burnt out; the damage done being considerable.

No further particulars should be necessary to prove that gas is far ahead of all other sources of motive power in point of cheapness, efficiency, reliability, and general convenience.

A few remarks on high-pressure gas lighting brought the paper to a close.

Production, Distribution, and Uses of Coke.

By E. W. L. NICOL, A.I.E.E., M.I.Mar.E., Engineer and Fuel Expert to the London Coke Committee.

In the course of his paper, the author said that in cities and towns the manufacture of coal gas and coke is, next to water supply, the oldest public utility industry; but records show that so long ago as 1681, or over one hundred years before the introduction of gas as an illuminating agent, a British patent was granted to a German chemist for "a new way of making pitch and tarre out of pit-coale, never before found out or used by any other." Even this inventor pointed out that coal from which the tar has been taken is better for use than before; but it was the general lack of appreciation of this fundamental fact, coupled with a growing appreciation of gas and output of coke, which led to the formation in 1913 of the London Coke Committee by Mr. D. Milne Watson, the Governor of the Gas Light and Coke Company. The chief function of this Committee is to promote the use of coke as fuel for domestic and industrial purposes; and though it is claimed that a certain measure of success has attended the Committee's efforts, it is fully realized that sustained effort is necessary in order to secure adaptation of domestic and industrial heating appliances and popularize the use of coke.

Formerly, there was a natural tendency within the gas industry to favour any process of gas manufacture which promised to absorb coke or eliminate its production; while most steam users, and practically all electrical engineers, regarded coke as useless or unsuitable for their purpose, however cheap or plentiful it might be. Those who at that time undertook to introduce coke as fuel to the notice of their trade rivals, the electricians, were openly regarded by them with as little toleration, and probably with quite as much disfavour, as the coke itself. Long and intimate association with coal and coal merchants had apparently rendered most steam users and engineers proof against any attempt to introduce coke, which fuel they often described as "half-burnt coal" or "coal from which all the goodness had been extracted at the gas-works." Others had, on more than one occasion, such as a railway or coal strike, tried it and found it wanting. Thanks, however, to the educational propaganda methods and apparatus adopted from the outset by the London Coke Committee, many steam users and electrical engineers are now numbered among the best friends of the gas industry.

The introduction of coke in lieu of coal, and of modern coke-burning appliances, by the London Coke Committee has raised many hand-fired steam plants to a relatively high degree of thermal efficiency, and their attendants to a position of comparative comfort and freedom from the unwelcome and often unpractical attention of the smoke inspector. Some five hundred sets of this apparatus, each capable of consuming 500 tons of coke per annum, have been made and fixed to hand-fired boiler-furnaces, with a view to enable steam users to eliminate entirely the use of crude coal. Incidental advantages realized, in addition to the total elimination of visible smoke, are: Increased steaming capacity and output of finished products, as well as very substantial financial savings, due largely to higher calorific efficiency obtained when coke is fired on rational lines. This latter financial consideration has, in fact, without exception been the dominant consideration in the introduction of coke. In the case of a London hospital recently dealt with, the saving effected by using coke in place of coal is at the rate of over £2000 per annum.

Experience has shown that the relatively low efficiency of the average coal-fired steam plant is occasioned very largely by the admission to the furnace of large quantities of air in excess of that necessary. This is often done to dilute or diminish the density of smoke emitted, in a conscientious endeavour to comply with the police regulations. In the aggregate, this practice must be the means of wasting a very large quantity of coal and, at least during the hours of daylight, of retarding output. These conditions have, however, paved the way for the introduction of coke. Its

introduction, on its merits, after exhaustive tests have in each case proved its efficiency, simultaneously with improved methods of firing, has, moreover, tended to fix in the minds of most users the relative value to them of coal as compared with coke, and thereby to establish a market for coke upon a reliable basis. Few have reverted to the use of coal; and the re-introduction of coal is, in fact, opposed by many engineers and boiler attendants, after their experience with coke.

By adopting scientific methods and skilled supervision, which, however, only few manufacturers can afford to maintain, it is, of course, possible to consume coal in boiler-furnaces with a minimum emission of smoke; but probably the most promising feature in the campaign for mitigating the smoke nuisance is the abandonment, by those who labour in this direction, of such impracticable appliances as the "smoke consumer," and the frank recognition that the one practical solution capable of the widest application is the substitution of smokeless fuel for smoke-producing coal.

Mr. Nicol then made some remarks upon the adapting of boiler-furnaces to the use of coke, mechanical stokers, and the now well-known "Sandwich" fuel system. He also instanced what has been done at the Greenwich power station. Turning to the question of open grates for coke, he said that, by encouraging the manufacture of the most efficient coke-consuming domestic apparatus, and by informing the public as to its use and advantages, the London Coke Committee have also been promoting the mitigation of the domestic smoke nuisance; and by filling the very important gap in the otherwise complete "all gas" heating scheme for new houses with a coke-fired boiler and an open coke-fire, coke has again shown how it is the indispensable ally of gas in realizing and maintaining that smokeless characteristic which he hopes will be made the salient feature in all new dwellings.

The introduction of coke as fuel for electric power stations by the London Coke Committee promises to have a far-reaching effect upon the future development of the electric supply industry, and also upon the better utilization and the conservation of the country's coal resources. The invention of the "Sandwich" system of firing coke has enabled existing coal-burning mechanical stokers in many important electric power stations in London and the Provinces to use up to 75 p.ct. of coke in conjunction with relatively inferior coal slack. These coke-burning power stations now rank among the most economical in point of fuel cost per unit of electricity generated; and the importance of the economies effected by the use of coke may be gauged by the fact that one London power station now uses over 40,000 tons of coke per annum. In this case alone, the country's gain in bye-products recovered from an equivalent quantity of coal is represented by some 800,000 gallons of tar, from which pitch, dyes, drugs, fuel oils, motor spirit, and high explosives are produced; and, in addition, over 800 tons of sulphate of ammonia.

Largely based upon the coke-firing experience thus gained, and in view of other practical and material advantages which would accrue as a result of closer co-operation between gas and electricity supply authorities, a scheme to erect a coke-burning power station of 200,000 KW. capacity on the River Thames in close proximity to the Beckton works of the Gas Light and Coke Company has been submitted, on behalf of nine of the most important electric supply companies in London, for the consideration of the Electricity Commissioners. The principle of co-operation embodied in this scheme has the support of many of the most eminent authorities in both the gas and electricity supply industries; and in the event of its being sanctioned and erected, this power station may be regarded as one of the greatest testimonials to the advantages derivable from coke used as fuel for steam raising.

The ultimate and only practicable solution of the smoke problem will, in his opinion, prove to be not, as some superficial thinkers have suggested, the universal use of electric energy, but the provision, in adequate quantities, of a smokeless combustible —that is, of a fuel capable of being consumed efficiently without the formation of visible smoke. In providing such fuels by separating and isolating with a minimum of loss the various combustible constituents of coal—solid, liquid, and gaseous—the gas industry holds the key to this solution, and is therefore capable of practically unlimited development. The important work accomplished by the London Coke Committee in forming favourable public opinion—the greatest of all factors in public affairs—and in demonstrating the advantages of coke as fuel, has opened-up for coke a future which should be limited only by the output and consumption of gas.

DISCUSSION.

Mr. R. HALKETT (Engineer and General Manager of the Sheffield Gas Company) emphasized the point that, in industrial centres, gas undertakings could not give too much attention to the fixing of furnaces and their general adjustment. He had occasion in Sheffield to investigate a complaint from one of the large works there as to over-consumption in the matter of gas. He had traced the whole of the trouble to mismanagement in the manipulation of the fittings. This had convinced him of the primary importance—especially in industrial centres—of making certain that the furnaces in the larger manufacturing works were being properly manipulated.

Mr. J. W. NAPIER (Alloa) said that while gas had undoubtedly played a very important part, and was going, he believed, to play a still greater part in the future industry of the country, he had the feeling that gas authorities in the past, and even at the present time, had not probably realized what their real duty was. It was true that they heard a great deal regarding the efficiencies of gas; but he was personally inclined to be somewhat suspicious that the efficiencies of the various gas authorities had not been reached with a single eye to the conservation of fuel. Criticism along these lines he was sure was bound to be helpful to the industry. Experience taught them that the quantity used of any commodity put on the market to-day was entirely based on the question of cost. There was no reason in the world why gas which was sold for industrial purposes should not be cheaper than it really was; and gas authorities ought to realize that it was in their own interest to make it cheaper. In his own particular area, which was entirely an industrial one, he had long ago been impressed with the necessity and wisdom of retailing gas for industrial purposes at a very low price. When gas was being sold at 2s. 1d. per 1000 c.ft. (pre-war rate), he reduced the charges for industrial requirements to as low as 40 p.ct. Similarly, in the use of gas for cooking purposes, advantages were given to consumers. The effect of this policy, of a low price over a period of years, was evidenced by the fact that, corresponding to the population, he had the largest gas consumption in Scotland, while his area stood fourth or fifth in this respect in Great Britain. Taking a broad view of the whole situation, he thought it would be a wise policy for gas authorities to reduce the price of gas for industrial purposes.

Dean of Guild BEATH (Convener of the Gas Committee at Arbroath) said that within the last few years the Town Council of Arbroath had gone in strongly for pushing the sale of gas-cookers; and though the total population was little more than 20,000, they had let out fully 6000 gas cooking appliances. It was interesting to note that this figure exceeded the number of householders in Arbroath. Cookers had been installed in all sorts of buildings, including church halls.

Mr. ALFRED I. PHILLIPS (New York), Engineer to the American Gas Association, who was invited by the President to speak, said that conditions in the United States were so very different from those in Great Britain that it was a trifle difficult for him to discuss the papers. In his country, the processes of manufacture differed radically from those in Britain. In point of fact, bye-products were with them a handicap rather than an asset. In America, as in Britain, the future of their industry and its expansion lay largely in developing gas for industrial purposes. It seemed to him that, in approaching the question of the industrial use of gas, they should always remember that a bargain ought to be beneficial to both parties. They should first of all be convinced that the installation they were seeking to have made would be beneficial to the user. A customer satisfied was an asset; a customer dissatisfied could do them incalculable harm. They should accordingly study the problems of their customers, not only in the broadest fashion, but the particular problem of the individual customer whose business they were seeking. The average industrial consumer, upon being approached on the subject of a gas installation, began to figure the cost of coal as against that of gas. The result was very often apt to be unfavourable to gas. They might go a little further, and show him that with gas he could save so many hours of labour; but perhaps even then the balance was still on the side of coal. From this part, the task of the gas engineer and the gas salesman was particularly difficult. They had to put forward intangible items—repairs cost, the removal of ashes, smoke nuisance, and a hundred-and one small things of which it was difficult to convince a customer. When all was said and done, they might have a manufacturer more or less convinced. But they had then to contend with the fact that possibly he had already an installation which was working with reasonable satisfaction, and why, he might urge, should he change? There was only one way to combat this—to show the prospective consumer a gas installation that was working satisfactory. It was here that an Association like theirs could be of inestimable benefit to the industry. In America, their competition with electricity in industrial work was even greater than in Britain; but, so far as the United States was concerned, in heating and other industrial work which could not be classed particularly as power, gas had more than held its own. He felt sure that their future in this line was of the brightest, provided they gave good service, and kept abreast of the times.

The conference was afterwards brought to a close with the usual votes of thanks to the readers of the various papers.

THE ASSOCIATION'S LUNCHEON.

From the Royal Technical College, the company repaired to the Trades House in Glassford Street, where the Lord Provost, Magistrates, and Gas Committee of the Corporation of Glasgow were the guests at luncheon of the members of the "B.C.G.A." Mr. MILNE WATSON presided, and gave the toast of "The City of Glasgow," which was appropriately acknowledged by the Lord Provost.

Councillor CUNDIFF (Manchester), in proposing the toast "Prosperity to the Gas Industry," remarked that neither the Government nor the public generally realized the great service that their industry had rendered during the war. Touching upon the fact that some housing schemes were being authorized by the Ministry of Health to introduce fittings for the rival forms of lighting, he explained that in the City of Manchester electricity as well as gas was being put in the houses. He believed this was a mistake, and that the Electricity Committee in Manchester would never receive sufficient revenue to enable them to pay the interest on the sinking fund in the laying of cables. A duplication of systems in this way was a scandalous waste of public money; and he thought the Ministry of Health should take up the question and declare with firmness and emphasis that houses would not rank for financial assistance if they were going to put in the two systems. He conceded it was essential to have gas for cooking; but it was not essential to have electricity at the same time.

Bailie RENFREW (Glasgow), briefly acknowledged the sentiment.

Other toasts were "The Press," proposed by Mr. F. W. GOODENOUGH and replied to by Sir ROBERT BRUCE, the Editor of the "Glasgow Herald," and "The Chairman," proposed by Dr. RUSSELL BENCROFT, the Vice-Chairman of the Southampton Gas Company.

At the Ideal Homes Exhibition.

On Wednesday afternoon the members of the Association paid an official visit to the Ideal Homes Exhibition at the Kelvin Hall.

Fully 150 participated in the outing, which proved both instructive and enjoyable. Naturally, the Smoke Abatement Stand attracted considerable attention, and Mr. W. M. Mason made an admirable exponent of the exhibit's "points." This, however, did not exhaust the sight-seeing. A call was made at the model all-gas house, where domestic gas apparatus is on view, and a demonstration was given in passing of the powers of the all-gas kitchen in the ordinary economy of the household. At the Cinema House—which is one of the features of the exhibition—the visitors found a programme built on the same practical lines awaiting them. The films dealt with subjects of particular interest to the users of gas and to the general public concerned in the problem of how best to secure the abatement of smoke. Stands which attracted the visitors were those of Gillespie, Ltd., whose products were strikingly represented with designs of ranges, registers, interiors, together with American and Anglo-American heating stoves from their Chattan Works, Bonnybridge, Scotland. The Chattan low-pressure hot-water system has been in marked request. Up till now this system was connected to a coal-fire range; but the firm recognize that in large towns where gas is cheap it would be a decided advantage to have it connected to the gas-cooker. Thus they are showing at the Glasgow Exhibition, for the first time anywhere, their "Panax" gas-cooker, which, connected up to their "G.U.G. Chattan" system, or any other system, gives an ample supply of hot water. It is important to note that they do this without any extra cost for gas, because their appliance in the cooker is so fixed that the gas which is doing the cooking in the oven is supplying the hot water at the same time. The "Konocoil" circulator, which is on view, makes a direct appeal to many interests—including householders, restaurants, hairdressing establishments, and football pavilions—everywhere, in fact, where gas-heated water is in demand. The Ramie Company, of Bredbury, near Stockport, makers of "Zeimar" gas-mantles, have an exceedingly interesting exhibit—giving visitors an insight into the process of manufacture.

The visitors then had the opportunity of inspecting a series of striking and unique photographs which are on view at the stands occupied by the Gas Department of the City of Glasgow. These photographs show the effect on a large industrial centre of the smoke which belches forth from factories and domestic chimneys. Pictorial emphasis is given to the fact that, on Sunday mornings, when the factory machines and forges are silent, and the chimneys are smokeless, the air is clear. By 8 o'clock on Monday mornings, pollution has already begun, though the sun appears to be making a fight for it; and by midday, the city is wrapped in a smoke fog. The process, according to the photographic demonstration alluded to, continues in the afternoon; and by 4.30 there is almost complete gloom. It is claimed by the demonstrators at the Glasgow Corporation stand that if the coal, instead of being burned in the domestic fireplace and the factory furnace, were distilled in the closed retorts of the gas-works, the unhealthy and dispiriting smoke pall would disappear. Glasgow, it is pointed out by the lecturers, is making rapid progress in this direction. There are in the city 150,000 gas-cookers, each one cooking on an average for five persons, which represents 750,000 persons a day. Of gas-fires, roughly about 35,000 are on hire, and probably another 35,000 have been privately purchased. To burn raw coal in the fireplace, kitchen range, or under a boiler is said to be just as great an act of folly as to burn a piano or an armchair, to keep oneself warm.

Service Charge at Providence (U.S.A.).

For the past eighteen months or so, a charge of $6 a year per meter, or 50 c. monthly, has been made by way of a "service charge" to all consumers by the Providence (R.I.) Gas Company; and Mr. F. C. Freeman, in publishing information regarding the scheme, says this is merely an arbitrary rate. As a matter of fact, the cost of service to consumers taking less than an average of 3000 c.ft. per month, works out at more than the rate quoted. But it is recognized that the form of charge is a step in the right direction, with the hope that ultimately a more equitable basis may be established, in accordance with which the service charge will be higher and the price of gas used less. It is, generally speaking, to be expected that those consumers who have been paying for less than they should have done will protest against a service charge rate. But the future growth of the gas industry probably lies in the industrial field; and if this class of gas business is forced to carry the cost burden for the small domestic consumer, the gas industry cannot hope to compete with electricity and other fuels. With the establishment of rates by which the consumer would carry his fair share of costs, or would more nearly do so, it would be found that low rates would be established for the large user of gas. Under proper rates, with low B.Th.U. and high-pressure distribution, the growth of the gas industry will be greater than ever before. The author explains in detail the method drawn-up by him for enabling a utility concern to determine the cost of service to various classes of consumers, and therefore what each consumer should pay per year other than the holder cost of gas. As bearing upon this subject, it may be noted that 81 p.ct. of the total number of consumers of the Company consume 1462 c.ft. per month, and only 43 p.ct. of all the gas sold by the Company; and that they pay $169,450 less per annum than their fair share. This deficiency is made up by the other 19 p.ct. of the consumers, who pay such an amount more than their fair share, and use 56 p.ct. of all the gas.

OXYGEN—IN THE RETORT-HOUSE AND IN THE DISTRICT.

By NORTON H. HUMPHRYS.

THE uses of oxygen, as opening-up the prospects of introducing an internal combustion process for the manufacture of town's gas, and also as a desirable constituent of the gas supplied in the district, have recently been set forth; but while the obvious advantages that may thus be obtained have been amplified, I have seen no recognition of difficulties and objections that are equally obvious.

Distinction must be made between the two applications, because the gas at the outlet of the internally heated retort or oven may not be expected to retain more than a nominal percentage of free oxygen. Anything approaching 10 p.ct. means a separate and distinct addition to the purified gas, as the mixture would not agree with the oxide purifiers. There is no question as to the advantages of a direct internal heating process in the retort-house, as compared with the indirect external method at present in universal operation, or of a pre-oxygenated gas at the burners (particularly those of the closed or atmospheric type), as practically increasing the proportion of the primary air, compared with the total complement of air required for complete combustion. But anyone who has had the curiosity to burn a fragment of coal or coke in pure oxygen, will recognize the fact that pure oxygen combustion is not a thing to be played with; and what about the corrosive influences of a substantial oxygen content in the holders, mains, wrought-iron distributing pipes, and consumers' meters? This aspect of the question is not raised in a hostile spirit, but rather in the hope that these matters may be successfully vanquished.

The Gas Regulation Act, 1920, introduces a financial difficulty, as it classifies oxygen as one of the useless diluents that are to be distributed free, gratis, and for nothing, if sent out at all; and to buy oxygen at a cost of at least 1s. per 1000 c.ft., to be eventually given away, looks like a step towards proverbial Irish business methods. For a 10 p.ct. proportion, the following would be the balance of debit and credit per 100 million c.ft. of gas distributed: Debit—10,000,000 c.ft. of oxygen at 1s. per 1000 c.ft., £500, *plus* expenses of distribution. Credit—*nil*. The specific gravity of the gas supplied would also be increased about 15 p.ct.

IN THE RETORT-HOUSE.

In all the ordinary types of externally heated retorts, the necessary temperature is obtained by the combustion of part of the excess fixed carbon remaining after the expulsion of the volatile matters from the coal. If the retorts are reasonably sound and there is no undue overpulling, no loss of volatile matter by combustion will occur; and this satisfactory condition should also be obtained under internal combustion. Volatile matter and the oxygen supply must be kept well apart, as might be secured in a vertical retort in which the charge was entirely spent before reaching the oxygen tuyères at the base. The objective will be much the same as that during the "run" in a C.W.G. set—to guard against the formation of substantial quantities of carbon dioxide, the most deleterious impurity, and the most expensive to remove. The ideal result is the conversion of the whole of the oxygen admitted into carbon monoxide, and the prevention of free oxygen from reaching the volatile matters. To this end, the admission must take a finely divided form, comprising a number of small currents, and diluted with steam, as any excess or "pocket" at any one point will stand a chance of getting too far forward, of raising unmanageable temperatures, or of causing explosion.

A certain extent of internal combustion is not a new thing. It obtains with well-worn retorts, overpulling, and a furnace gas containing oxygen in excess—a not uncommon combination. It produces high local temperatures, some loss of hydrogen and hydrocarbons by combustion, and not the increase of carbon monoxide that might be expected. There is evidence of reactions other than those in general experience, and something in this direction may be expected to follow the introduction of internal combustion. In the "Journal of the Society of Chemical Industry" for Aug. 31, p. 307 R, will be found an article on the "Catalytic Oxidation of Hydrocarbons, Alcohols, and Carbon Monoxide;" and the section dealing with oxides of carbon affords some information on the selective combustion of carbon monoxide in the presence of hydrogen, as assisted by a suitable catalyst. Reference is made to the experiences of E. K. Rideal, as related in the "Journal of the Chemical Society," 1919, p. 993, who found that in no case examined was the selective action complete, and that increase of temperature tended to diminish such selective action and the oxidation. In a mixture of eight parts of hydrogen to one part of carbon monoxide, he did not obtain a greater ratio of carbon monoxide burnt than 5 to 1. If a selective action in greater extent cannot be obtained, presumably under the best conditions of temperature, &c., and with the stimulus of a suitable catalyst, what can be expected in a carbonizing retort, where the use of a catalyst is not practicable, and a high temperature and other conditions favourable to satisfactory carbonizing results must be maintained? In such circumstances the limitation of the combustion to the production of carbon monoxide will not be an easy task.

IN THE DISTRICT.

Turning to the objections against oxygenated gas in the district,

a general impression has existed among gas engineers for many years to the effect that the corrosive action of oxygen on metals renders its presence in any quantity undesirable. Some years ago, there was much discussion for and against the now very general custom of admitting air to the gas before the purifiers, in quantity sufficient to ensure revivification *in situ*; and it was seriously contended that even as much as 1 p.ct. would be unpleasantly in evidence. In studying published researches on the effects of oxygen, we must remember that the content of oxygen in town's gas averages 0·7 to 0·8 p.ct., and that it rarely exceeds 1 p.ct. Gases of this quality are responsible for the observed effects on services, meters, &c.

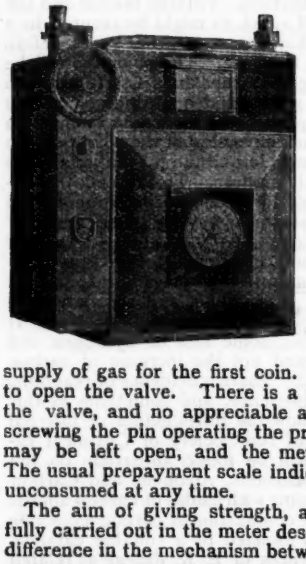
A glance at the classical researches conducted by Mr. J. G. Tapley under the auspices of the Life of Meters Research Committee appointed by the Council of the Institution of Gas Engineers, affords definite evidence. The salts present in the liquid condensed in gas-meters of the dry type under ordinary operation were found to consist entirely of completely oxidized compounds. [See "Transactions of the Institution of Gas Engineers, 1918-19."] They include ferric and ferrous sulphate, ferric thiocyanate; ammonium thiosulphate and thiocyanate; also sulphates of tin and zinc, together with free sulphur, formed by the oxidation of iron in the first place, followed by the absorption of sulphur and subsequent revivification *in situ*. Further information on the action of oxygen is given in the "Transactions" the following year. The soluble salts may possibly be carried to the nearest drip by condensed water; but ferric oxide and free sulphur are not soluble, and cannot be completely and satisfactorily removed without taking the pipes apart. The force-pump is a remedy for the time being. But repeated "blowing" leads to accumulations of solid matter in elbows or other sharp curves; and if the obstruction is entirely carried through to the main, it accumulates and causes trouble in time.

The difficulties of dealing with pure oxygen, either in the retort-house or the district, are due to its intense chemical activity. Like high explosives, it should be cautiously handled.

PEEBLES' FRONT CHANGE-PLATE PREPAYMENT GAS-METER.

Attention has been called to a new slot-meter put upon the market by Messrs. Peebles & Co., of Edinburgh, the size of the attachment of which will commend itself to most managers, as it only increases the width of the meter by 2¾ in.

The idea of the inventor has been to keep the attachment and valve entirely outside the gable of the meter. The operating shaft from the meter mechanism proper passes through a stuffing-box in the meter gable. The changing of the price is simplicity itself, and can be done in a few seconds. On removal of the cash-box, a wire bolt is withdrawn, which binds the cover in two places to the coin-box. The cover is then lifted off the index pin, and placed on again at the new setting. The bolt is then pushed home.



With this attachment, the price could be changed even in the dark—it is so simple. A large valve is provided, which opens to give a full supply of gas for the first coin. There are no springs required to open the valve. There is a minimum of friction in closing the valve, and no appreciable absorption of pressure. By unscrewing the pin operating the prepayment valve lever, the valve may be left open, and the meter used as an ordinary meter. The usual prepayment scale indicates the number of feet of gas unconsumed at any time.

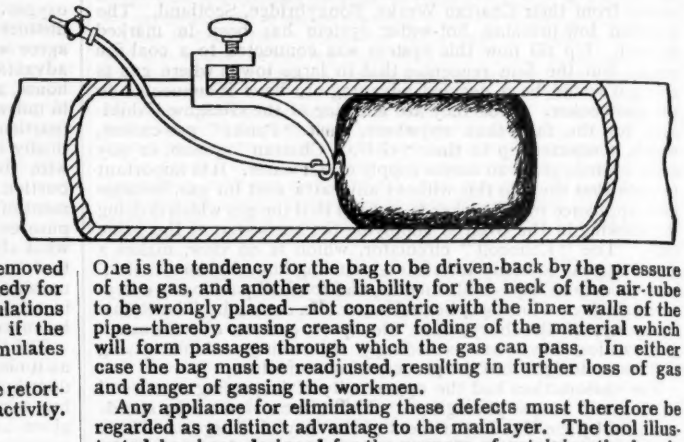
The aim of giving strength, accuracy, and simplicity, seems fully carried out in the meter described. There is only a slight difference in the mechanism between the 1s. and 1d. meter.

Mixed Manufactured and Artificial Gas.—Plans for an extensive artificial gas plant are being prepared by the Iroquois Natural Gas Company; and at the same time an application is being made by the owner of the Buffalo gas plant to transfer his interests to the Niagara Gas Corporation. The application is a step in the direction of the consolidation of the artificial and natural gas services, so that a mixed product may be supplied. It was, however, felt that the natural gas supply must be supplemented, and that the building of a modern plant and the mixing of the two gases will furnish a satisfactory supply for the whole of the city. Last winter some natural gas users had hardly enough gas to cook with even when the weather was not severe. Manufactured gas consumers have had, on the other hand, a constant supply; but they have been paying for it $1·65 per 1000 c.ft. The natural gas rate now is a minimum of 40 c. and a maximum of 60 c. per 1000 c.ft.

DOUGAN'S SAFETY-STOP FOR GAS-MAINS.

The operation of "bagging-off" a gas-main for the purpose of extension or repair is always attended by an element of risk—small or great according to the amount of skill and care displayed by the workmen engaged in the task. Unfortunately, a certain loss of gas is unavoidable while the bags are being inserted in the pipe; but a clay-pad, kept ready as a stopper to the bag-hole and used as such at all times other than when the bag is actually passing through the hole, will reduce the loss to the smallest possible amount. The proper and constant application of the clay-pad, as well as keeping his head below the stream of gas, are within the control of the operator.

There are other factors, however, not so easily disposed of.



One is the tendency for the bag to be driven-back by the pressure of the gas, and another the liability for the neck of the air-tube to be wrongly placed—not concentric with the inner walls of the pipe—thereby causing creasing or folding of the material which will form passages through which the gas can pass. In either case the bag must be readjusted, resulting in further loss of gas and danger of gassing the workmen.

Any appliance for eliminating these defects must therefore be regarded as a distinct advantage to the mainlayer. The tool illustrated has been designed for the purpose of retaining the bag in position, and guiding the neck of the air-tube to its right place in the centre of the main. Added to the former, the inventor claims that should a bag become slack, owing to a slight leak on the cock or material, as it cannot move forward, the pressure will tend to distort its shape, forcing the canvas into close contact with the sides of the pipe and limiting the leakage. Whether these claims can be substantiated in actual practice is for the gas engineer to prove; but the invention is at least worthy of a trial, and the natural reluctance of the workmen to alter his methods should not be allowed to stand in the way of its success.

We understand that the apparatus—the invention of Mr. O. W. Dougan, of No. 65, St. Anne's Hill, S.W., who has had 38 years' experience with a London Gas Company, and is still engaged in distribution work—has so far fulfilled its purpose.

The Tozer Low-Temperature Retort.

At the Fraser and Chalmers Engineering Works, owned by the General Electric Company, Ltd., low-temperature carbonization plant is being built to the designs of Mr. C. W. Tozer, illustrated particulars of whose retort appear in recent numbers of the "Engineer," as well as in the "Register of Patents" on another page of this issue of the "Journal." The Tozer retort, our contemporary explains, is made of iron. The inner tube, formed by the surrounding annuli, is not filled with coal, but acts as a gas passage connecting the upper and lower ends of the retort; so that the gases evolved can pass partly upwards through the body of the coal, and partly downwards. Those gases that pass downwards find their exit through the centre tube, and meet in the upper part of the retort the gases which pass directly upwards from the upper half of the charge. There is undoubtedly a neutral point (which naturally varies) where the gases are divided into an upward and downward stream, thereby accelerating their exit velocity. The charging and discharging doors are made tight by a special arrangement; and the lower door is balanced by counter-weights. When carbonizing a bituminous coal, the coke comes out in slabs, having a length practically the same as that of the retort, and corresponding exactly with the shape of the cells. If the coal is a non-coking one, the coke comes out in practically the same physical condition as the entering charge. The retort, which is heated by a specially designed recuperative setting, will, it is claimed, deal with practically every description of carbonaceous material, and will carbonize and produce coke from even colliery sludge or washings. A photograph was given in the "Engineer" of a setting of six of these retorts at Battersea, which has been in constant use for over seven years without showing any signs of deterioration. The retorts are arranged in two rows; and they are all built in a brickwork setting. The mouthpieces at the tops of the retorts are arranged to carry the covers, and also the gas-outlet.

Mr. E. H. Cuningham Craig, B.A., is to lecture on the "Geology of Petroleum," on Monday evening, Oct. 10, at the Sir John Cass Technical Institute, Jewry Street, E.C., when the chair will be taken by Sir Frederick Black, K.C.B. This lecture will form the introduction to the course of instruction in petroleum technology which is a new development at the Institute.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

"Gas Supply" Examinations.

SIR,—Now that the technical classes in connection with the examinations in "Gas Supply" are recommencing, I have referred again to your issue of July 13, in connection with Mr. Kendrick's criticism and suggestions regarding special points to be noted by lecturers at the classes for this examination.

It is extremely useful to have the Chief Examiner's remarks on these points; and I hope the standard of papers reviewed by him next year will be improved on the lines he desires. I feel, however, that in one direction his criticism of the answers to the only question dealing with mains in the Final Grade are somewhat undeserved. Presumably, they are based on the answers received to question No. 2, which was the only one dealing with this portion of the subject. In my own opinion, a student would be very well-advised to leave such a question severely alone, and occupy his time with others more clearly defined as to the information desired by the Examiner. So little essential data are given in the question, that to answer it—even in general terms, setting out all the possible conditions that might exist, but of which no indication is given—would occupy very much more time than that at the student's disposal.

If Mr. Kendrick had set a question with more essential details of the existing conditions on the system, he might not have found it necessary to complain of the lack of knowledge shown by the students on this particular head.

R. G. MARSH.

Birmingham Gas Department, Oct. 3, 1921.

"The Newest Gas."

SIR,—Mr. C. B. Tully has asked me to forward you an article, written by him, on "The Newest Gas" [see p. 29].

It may interest you to know that the process termed complete gasification has come to stay; and without venturing on the delicate ground of prophecy, I am in a position to affirm that results have been obtained of a startling nature in this direction, and will be made public before very long.

I followed the development of the steam-turbine since I joined my old master, Hon. Sir Charles Parsons; and it was scoffed at as a steam-eater until it became a 30,000-KW. unit, and the scoffing ended. I then became interested in the Diesel engine, when one of the best-known consulting engineers in this country remarked that, as far as he knew, the largest Diesel engine which had been built was only 500 B.H.P. and that it had been a failure; and I saw my firm (Messrs. Sulzer Bros) putting a 4000 B H.P. Diesel engine on the stocks. I foresaw the development which was bound to take place in mechanical transport as the result of the autumn manœuvres in September, 1912, in which I served as a despatch rider. I spent my energies during the war on M.T., arriving at the front on Oct. 4, 1914. The importance of mechanical transport to the success of the operations was amply proved.

After the armistice I determined to get to the root of the matter, and was convinced that there was great scope in complete gasification for an enormous development in efficiency in the use of coal; and I am prepared to pardon all the scoffers who have harped on the inevitable difficulties in such an innovation, and to face "vested interests" calmly, as I know they must bow to scientific fact.

P. SANDFORD.

47, *Victoria Street, Westminster, S.W.*,
Sept. 30, 1921.

How to Burn Coke.

SIR,—Referring to Dr. J. T. Dunn's letter to the "JOURNAL" of Sept. 21, I regret not having had an opportunity of replying sooner. The writer can, however, assure Dr. Dunn that, whether he is right or wrong, criticism is readily welcomed from his able pen, and no apology is in any case required.

The subject-matter of Dr. Dunn's letter is the principle which I endeavoured to explain is embodied in the construction of the Danish coke-burning stoves. Dr. Dunn writes that my explanations of the principles are not clear to him; and he is good enough to opine that the same are not clear to myself.

In the sectional drawings the "JOURNAL" was kind enough to publish, it was shown that the stoves are types in miniature of air-gas producers, and that the primary air entering the furnace or fireplace would be converted by oxidation to CO_2, and later resolved into CO in the hotter zone, which in its turn, by the action of the introduced secondary air, would be consumed to CO_2 in the combustion chambers with which the stoves are fitted. I explained that these combustion chambers were surrounded by air-jackets, through which the air in the room or from an outside source would circulate.

I pointed out that, to produce these effects, a deep fuel-bed was necessary. Further, I indicated that the sensible heat evolved by the conversion of the CO_2 to CO was available for heating the flues, and incidentally the air-jackets, in addition to the heat generated by the combustion of the CO. I likewise expressed the opinion that the combined results of the two reactions are exothermic.

Dr. Dunn writes that I have not raised the question of the difference between burning coke in an open grate and in a closed stove. I certainly did not, because to waste your space or my time on such an elementary and well-understood matter did not occur to me. But to please Dr. Dunn, it may be stated that, by consuming coke in a thin layer in an open grate, we burn it at once to CO_2; and if 24 lbs. of coke be consumed in this manner, theoretically, 97,600 calories of heat would be produced. We should, however, realize but a fraction of this theoretical heat, as the inrush of the uncontrolled air neutralizes the efficiency by cooling the fire; and many of us know how difficult it is, with a thin body of coke, to keep the same in an open fireplace in a state of satisfactory incandescence. If, however, we enclose the fireplace, increase the depth of fuel, and regulate the supply of the primary and secondary air, we obtain quite a different state of things, and approach the conditions of a producer.

Where the primary air first enters into contact with the hot coke we have the equation $C + O_2 = CO_2$, or theoretically with an evolution of heat from (say) 24 lbs. of carbon equal to 97,600 calories. If on the 24 lbs. of carbon we superimpose another 24 lbs., and this is brought to a satisfactory state of incandescence by the heat of the lower layer of carbon, the up-going CO_2 will be reduced in the second hot layer of 24 lbs. of carbon to CO, but with a loss of 38,800 calories stolen from the 97,600 calories. The equation will then read: $CO_2 + C = 2\,CO$ *minus* 38,800 calories. The ultimate combustion, however, of the CO gas obtained from the upper 24 lbs. of carbon will yield as per formula $2CO + O_2 = 2CO_2 = 136,400$ calories; so that the final result of heat from (say) 48 lbs. of carbon would be 195,200 calories.

But it must be pointed out that the eventual combustion of the CO gas to CO_2 will only give 70 p.ct. of the theoretical heat, as 30 p.ct, has been liberated in the producer itself. This liberated heat is termed sensible heat, and if it can be used without cooling, is a valuable asset to the thermal balance-sheet; but if allowed to cool, it must be counted as a dead-loss. Incidentally, herein lies the loss and weakness in endeavouring to use producer gas for retort-heating, where the sensible heat is not available; and when I state that the sensible heat of producer gas as it issues from a producer is round about 700° to 800° C., it is easily understood what the loss means.

The sensible heat of the coke, however small in amount, in the Danish stoves is well utilized, as it is, as before stated, employed with the combustion of the CO gas in heating the air chambers; and for this reason I referred to it in my article. Theoretically there is no heat advantage in burning carbon either direct to CO_2 or by two stages through CO to CO_2. In fact, the latter method involves loss; but it is a convenient means for conveying heat, and on the double-stage system producers have been evolved.

This is a long letter in reply to Dr. Dunn's; but as he requested to be convinced, and as he expressed himself as not clear about sensible heat and thermal reactions, I have endeavoured, in as elementary a manner as possible, to cover the points he has raised.

F. D. MARSHALL.

19, *Queen Anne's Chambers, S.W., Oct.* 3, 1921.

"N.B.C." Lubricating Oils Cheaper.

SIR,—The following revised price list for "N.B.C." lubricating oils shows a very considerable reduction per gallon as compared with our price list of June 1.

Retail Price List.

	40-Gall. Barrel.	5-Gall. Drum.	1-Gall. Tin.	½-Gall. Tin.
	Per Gallon.	Per Gallon.	Each.	Each.
Medium . .	5s. 8d.	6s. 3d.	8s. 3d.	5s. 1d.
Heavy . .	6s. 2d.	6s. 9d.	8s. 9d.	5s. 4d.

Packages free and non-returnable.

We have been fortunate in obtaining large supplies of the various constituents at a much reduced figure, and are therefore able to make this substantial alteration in price without in any way sacrificing the excellent qualities of the oils themselves.

At the request of many motorists and traders, we have also decided to market our oils in 1-gallon and ½-gallon tins, which we consider will be of great service to private motorists.

We are very anxious, as producers of "National Benzole," that every advantage to be obtained from its use should be developed to a maximum; and to this end we cannot too strongly urge the use of "N.B.C." oils for lubrication.

NATIONAL BENZOLE COMPANY, LTD.,
ARTHUR J. TIBBITT, General Manager.

30, *Grosvenor Gardens, S.W., Sept.* 28, 1921.

Imperial Continental Gas Association.—There is announced an interim dividend out of the ascertained profits of the half year ended June 30 at the rate of 3 p.ct. on the capital stock, payable, less tax, on Nov. 15.

Price of Gas in the Potteries.—The Stoke-on-Trent Gas Committee last week recommended, and the Council confirmed, increases in the price of gas for the ensuing quarter as follows: Stoke, 2d. per 1000 c.ft.; Burslem and Fenton, 4d.; Longton, 5d. Alderman A. Brookhouse (the Chairman of the Committee) said these increases had been rendered necessary entirely owing to the coal stoppage. It was estimated that the increased price of coal had involved the department in a loss of £14,000.

Reduced Gas Consumption in Birmingham.—The output from the Birmingham Gas-Works continues to be about 20 p.ct. below the usual rate at this period of the year; and there are at present no indications of a substantial increase in consumption. It is anticipated, of course, that the suspension of "Daylight Saving" from the beginning of this week will give a fillip; but allowing for this, the Gas Department state that there will still be a considerable deficiency between the capacity of the works and the consumption. The fear entertained by the Committee is that it may become necessary to stop production at one or two of the smaller gas-works. Naturally, the Committee will be loth to resort to such a course, in view of the present unemployment. It is pointed out, however, that if the department continue to spread the manufacture of gas over five works when three can produce all that is required much more economically, they will be spending money which can only be obtained by maintaining the price of gas at a high figure. Evidence is not wanting that the high price of gas is contributing substantially to reduction of consumption. It is probable that in the near future the Gas Committee will be asked to decide what course shall be taken.

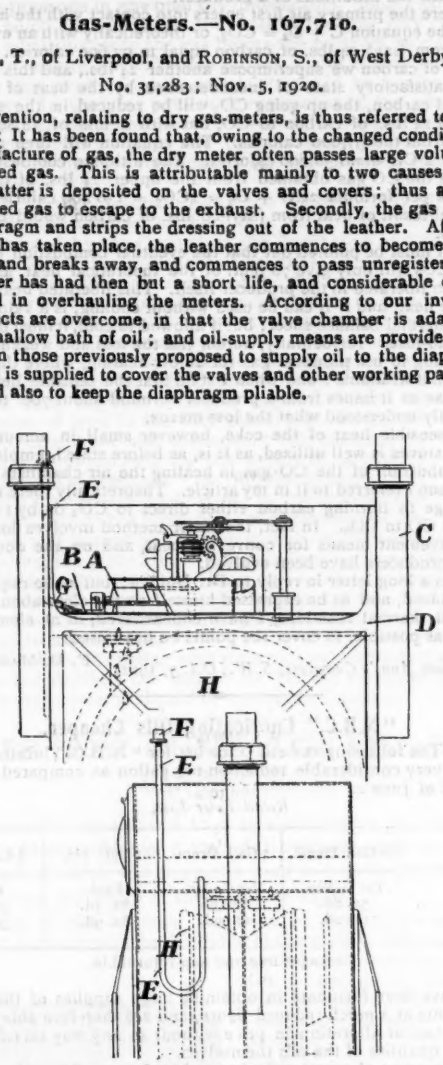
REGISTER OF PATENTS.

Gas-Meters.—No. 167,710.

FOX, T., of Liverpool, and ROBINSON, S., of West Derby.

No. 31,283; Nov. 5, 1920.

This invention, relating to dry gas-meters, is thus referred to by the patentees: It has been found that, owing to the changed conditions of the manufacture of gas, the dry meter often passes large volumes of unregistered gas. This is attributable mainly to two causes: First, foreign matter is deposited on the valves and covers; thus allowing unregistered gas to escape to the exhaust. Secondly, the gas acts on the diaphragm and strips the dressing out of the leather. After this stripping has taken place, the leather commences to become porous and hard and breaks away, and commences to pass unregistered gas. The leather has had then but a short life, and considerable expense is entailed in overhauling the meters. According to our invention, these defects are overcome, in that the valve chamber is adapted to retain a shallow bath of oil; and oil-supply means are provided which differ from those previously proposed to supply oil to the diaphragm, in that oil is supplied to cover the valves and other working parts with a film and also to keep the diaphragm pliable.



Fox and Robinson's Dry Gas-Meters.

Inside the top of the meter shown is the chamber which encloses the valves A. These valves (of any known type) must have their seats raised above the level of the valve plate B. The gas, on entering the meter, travels down the side pipe C and then along the horizontal pipe D, below the valve plate as shown, in which case entrance to the valve chamber is afforded by a hole in the plate. The pipe D may, on the contrary, run horizontally above the valve plate to the top of the valve chamber, necessitating the provision of a hole in the bridge to allow the gas to enter. In the former case there is around the hole [not shown] in the plate a vertical wall of like material, the height of which above the plate exceeds that of the valve seats.

Fixed to the side of the meter is a metal tube E, of small cross section and of U form, provided at the top with a cap F adapted to be sealed to prevent interference and at the bottom with a bent portion G entering the valve chamber. Prior to use, or when necessary during use, oil is poured down the pipe E, by which it enters the valve chamber to half way up to the surface of the raised valve seats, thus entirely covering the bottom of the chamber. Owing to the "creeping" of the oil, it covers the valves and valve seats and all working parts, and when these latter move, oil is thrown in small quantities down the valve ports on to the leather diaphragm H. The oil is prevented from entering the pipe D by the wall fixed to the valve plate. Should the tube E not be gas-tight at the top end when the cap F fits, the escape of gas from the valve chamber is prevented by the seal of oil in the U tube. When the meter is in use, oxidation of the surface due to the action of constituents of the gas is prevented by the film of oil which gradually creeps over the surface of the valve chamber.

Inverted Incandescent Gas-Burners.—No. 167,571.

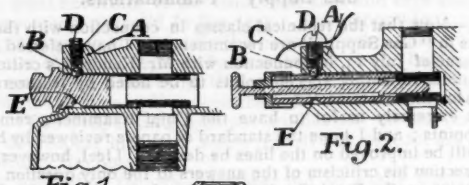
WORSFOLD, J., of East Dulwich, S.E., and SMITH, A. J., of Croydon.

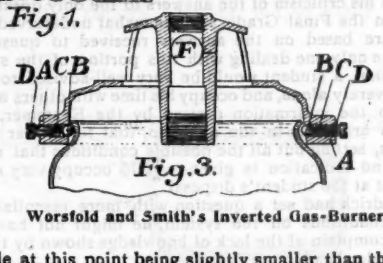
No. 12,864; May 10, 1920.

These improvements in the method of retaining in position removable regulating gauzes of inverted burners and lamps consist in the use of a ball-and-spring device, instead of the ordinary set-screw, and, more particularly, in relation to the removable regulating gauzes as described in patents No. 7515 of 1911 and No. 17,902 of 1913.

Figs. 1 and 2 are sections of the burners and lamps.

Instead of internally threading the hole into which the usual threaded screw is inserted, it is made of a larger diameter, and there is inserted a small metal ball B of hard rustless metal. The diameter of the ball is such that it projects partially through the casing A into or against the removable regulating gauze F; but, owing to the diameter of the





Worsfold and Smith's Inverted Gas-Burner.

drilled hole at this point being slightly smaller than the diameter of the ball, the ball is retained in the drilled hole. On the top of the ball is a spiral spring C, secured in its predetermined position by a square headed taper pin D, or the hole may be threaded and a round-headed screw used.

Upon inserting the removable regulating gauze in the lamp or burner the ball and spring are depressed, and upon reaching its pre-determined position the ball is returned by the action of the spring to the groove E formed in the fitting, at the same time allowing the fitting to revolve freely.

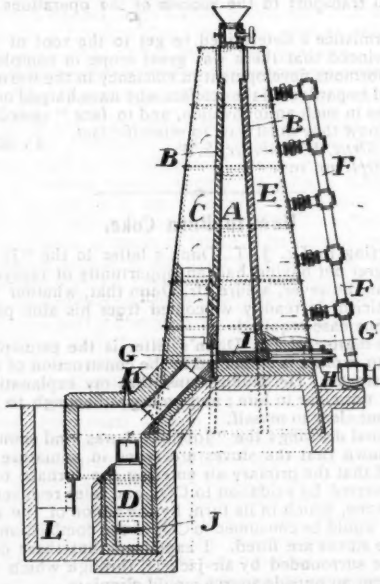
In fig. 3 is shown the device applied to a gallery or shade-carrier in which the removable regulating gauze F forms a part.

Distilling Carbonaceous Material.—No. 167,822.

PERRY, W. P., of Leytonstone.

No. 12,894; May 10, 1920.

This invention relates to apparatus for treating carbonaceous material in a distilling or carbonizing chamber in which moving material is brought into actual contact with moving hot gas, and in which the solid residue of the material is utilized in an adjacent gas-producer placed at a lower level than the distilling chamber.



Perry's Apparatus for Distilling Carbonaceous Material.

In the arrangement shown the material is passed from the top to the bottom of the distilling chamber A and the coke removed; the walls of the chamber being provided with openings B (on opposite sides) leading to chambers—one C, forming a gas distributing chamber, receiving the gas from a generating chamber D, and the other E a collecting chamber leading by pipes F to apparatus for dealing with the vapours and gases, or one having a chamber wherein the hot gas to distil the material is generated, and the other leading by a plurality of pipes (connecting the openings) to further apparatus.

The hot residue or coke from the bottom of the distilling chamber A passes into the gas generating chamber D, at the top of the fuel level direct, so that, not only is the heat economized, but the producer gas, not being cooled by incoming fuel, passes hot to the distributing chamber above, and thence into and through the distilling chamber.

Openings G are found in the walls on opposite sides, one leading

into the lower part of the distilling chamber and the other forming a casing H for the plungers I, by actuating which the residue is forced from the bottom of the chamber A through one of the openings into the chamber D. Instead of a plunger a spiral or other conveyor, or other mechanical contrivance, may be positioned at the base of the distilling chamber.

Two plungers are shown, each advancing alternately from within a casing H in the wall of the distilling chamber opposite to the discharging opening, pushing the coked residue before it through the opening in the wall and into the gas generating chamber D and on to the hot fuel in it. This materially assists in producing the gas in the gas generating chamber; and, on the action of the conveying means, the material in the distilling chamber falls to replace that removed.

The hearth J in the chamber D is below the opening from the distilling chamber; and if it should be necessary that green fuel be supplied to the generating chamber, it may be fed from the top or at the side through a gas-tight valve, or other suitable mechanism.

The plungers are of a length to fill-up the recess or casing H in the wall of the distilling chamber; so that when they advance no residue can get behind them and interfere with their withdrawal. For the same reason, the plungers may be arranged to fill-up the bottom of the distilling chamber when positioned therein.

In the wall of the gas producer opposite to the opening through which the residue enters from the distilling chamber is another opening; and if the producer should not consume all the residue that it receives from the distilling chamber, the surplus is, by the force of the conveyor behind it, pushed on and through this other opening, and thence through a gas-tight valve to be dealt with in any suitable manner.

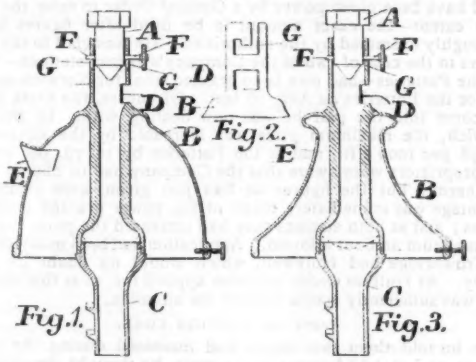
There is shown a sloping conduit K between the generating chamber D and the distributing chamber C, and the residue from the distilling chamber A passes down the slope K into the chamber D. But if the gas generating chamber is full, the surplus passes over the top and into the chamber L, where it can be lifted by an endless screw [not shown] to be dealt with in any suitable manner.

Incandescent Gas-Burners.—No. 167,830.

ROGERS, R. J., of Edgbaston, Birmingham, and THORP, F., of Whitefield, near Manchester.

No. 13,151; May 12, 1920.

This invention, relating to incandescent gas-burners, has for its object "to provide an improved burner made from a minimum number of parts and adapted for ready assembly and service."



Rogers and Thorp's Incandescent Gas-Burner.

Figs. 1 and 2 are sectional elevations of two designs of the burner; and fig. 2 is an end view showing the adaptation of the burner crown for a bayonet joint connection with the gas-nipple.

The burner, in its three forms shown, comprises the nipple A, the burner crown B (which supports the globe) with bunsen tube formed therewith, and the burner head C, which has lugs on it to carry the mantle. The burner crown, with its bunsen tube, may have the usual air-inlets formed in it, adjacent to the gas nipple, or have an air-inlet (as D) formed at one side only as shown; the outlets E for the escape of the products of combustion from within the crown being formed at the other side.

The nipple supports the crown and its attachments by a bayonet-joint as shown; there being two lugs F upon the nipple which enter slots G in the bunsen tube part of the crown. One of the lugs may be formed by the stem of the valves which regulates the adjustable extra gas supply; and such stem may have a square or hexagonal portion formed on it which rests in the bayonet joint slot, so that there is no liability of the stem turning and so inadvertently varying the gas supply.

Gas-Fires.—No. 167,998.

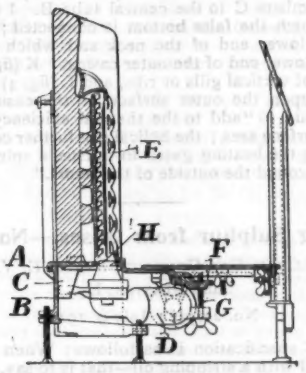
AIRD, K., and WEBSTER, S. A. D., of Falkirk.

No. 36,487; Dec. 30, 1920.

This invention relates chiefly to the class of gas-fire described in patent No. 152,191, and consists principally in providing the fuel plate to hold the firebrick back, the burner, and injector nozzle with "devices to position the radiants in relation to the burner nozzles—the burner being held to the fuel plate at three points to give flexibility."

A side sectional elevation of the stove is given.

The fuel plate is provided with a hooked projecting lug A at its rear edge which engages the structure B, which carries the fuel plate, from the back edge of which depend two saddle-pieces C intended for carrying the burner D by projecting lugs. At a line just in front of the saddle-pieces the fuel plate is formed with a series of holes having between them two series of projections over which the columnar brilliants E are positioned and held by resting between the projections.



Aird and Webster's Gas-Fire.

At mid-distance on the front edge of, and at a lower level than, the fuel plate is a nosepiece F, having a screw-threaded hole for a screw with a winged button for engaging a slotted lug on the burner.

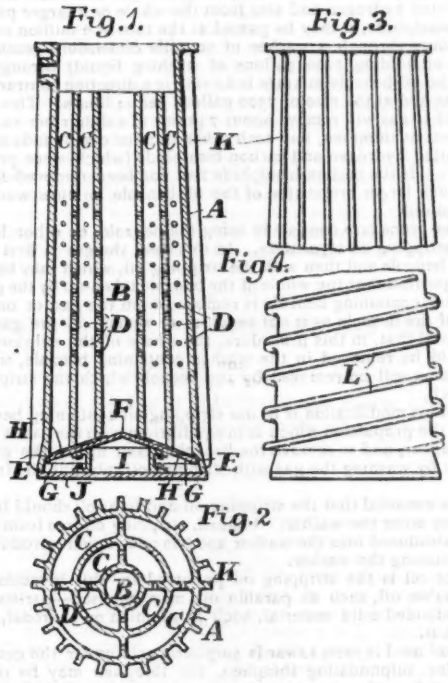
The burner D is provided with two lugs on one side and a slotted lug on the other. In positioning in the fuel plate the two lugs are carried by the saddles C and the slotted lug by the head of the screw G, and, by reason of the one slotted lug and the two lugs having a free movement in the saddles, the burner nozzles can be correctly adjusted with regard to the openings H and will be maintained at that position by the tightening of the screw G. Further, the burner being supported on three points, perfect flexibility is given to it under all conditions without affecting its position with regard to the brilliants.

Vertical Retorts.—No. 168,229.

TOZER, C. W., of Victoria Street, Westminster.

No. 22,638; July 30, 1920.

According to this invention the total length of the vertical retorts is made less than that of the hot zone of the furnace, which extends both above and below the charged portions of the retorts, "so that the carbonization of the charge takes place evenly throughout the whole length of the charge."



Tozer's Vertical Retorts.

Fig. 1 is a vertical section of the retort; fig. 2 is a horizontal section; fig. 3 is an elevation of the upper part of a retort, showing the employment of vertical ribs or gills; and fig. 4 is a similar view of the lower part of a retort provided with helical ribs or gills.

A is the outer casing of the retort; B, the central tube; and C, the annularly arranged vertical chambers. These chambers do not extend either to the top or bottom of the casing; and their walls in the middle zone are furnished with holes D, which permit the free flow of gases throughout the charge of coal. The lower ends of the chambers C are shaped so that the interior of the open lower end of the retort is of conical form; and this open end is surrounded by the annular seating E.

F is a false bottom, having an annular flange G, which bears against the seating E. This false bottom is of conical shape conforming to that of the open end of the retort; and a space H is left between the false bottom and the retort end, when the former is in position, as shown in fig. 1. This space serves to permit the passage of gases from the vertical chambers C to the central tube B. I is the neck to the upper end of which the false bottom is connected; and J is the door secured to the lower end of the neck and which is adapted to be attached to the lower end of the outer casing. K (figs. 1, 2, and 3) indicates a series of vertical gills or ribs, and L (fig. 4) a series of helical ribs, provided upon the outer surface of the casing of the retort. These ribs are said to "add to the thermal efficiency of the retort by increasing the surface area; the helical ribs further contributing to this result by causing the heating gases to pursue a spiral, and therefore extended, path around the outside of the retort."

Removing Sulphur from Gases.—No. 168,482.

SOUTH METROPOLITAN GAS COMPANY, EVANS, E. V., HOLLINGS, H., and STANIER, H.

No. 20,332; July 9, 1920.

The patentees' specification is as follows: When coal gas or like gases are washed with a stripping oil—that is to say, creosote or certain other oils—in known manner for the purpose of removing benzole from the gas, carbon bisulphide and thiophen are partially removed by the oil at the same time. It has been ascertained that the degree of removal effected is proportional to the quantity of benzole contained in the oil, although the presence of high boiling-point oils (such as creosote) exerts a beneficial influence in reducing the vapour pressure of the sulphur compounds in solution. By the present invention, advantage has been taken of this observation for removing sulphur compounds other than sulphuretted hydrogen.

For this purpose the gas (from which sulphuretted hydrogen has preferably been removed) is washed with both a volatile oil which is a solvent for thiophen, and a stripping oil; the quantity of the latter being not less than 500 gallons per million cubic feet of gas treated. Benzole is a suitable volatile oil, as also are its several constituents, benzene, toluene, and xylenes, whether in their commercial form or in purified condition.

There are several modes of applying the invention. The preferred procedure consists in passing the gas containing sulphur compounds through a mixture of creosote oil and benzole which is in equilibrium with the gas as regards benzole. In the case of ordinary coal gas at the ordinary atmospheric temperature, this condition is satisfied when the mixture contains 5½ to 6 p.ct. by volume of benzole.

This form of the invention is distinguished from the proposition for removing naphthalene from coal gas, made in patent No. 2318 of 1899, by the fact that the quantity of oil used according to that specification is far too small for the removal of sulphur compounds.

As an example of the invention, when the gas has been freed from sulphuretted hydrogen and also from the whole or a larger part of its carbon bisulphide, it may be passed at the rate of 2 million cubic feet per 24 hours through a washer of suitable dimensions (such as one capable of holding 1200 gallons of washing liquid) through which washer the oil-benzole mixture is flowing in a direction contrary to that of the gas and at the rate of 2500 gallons per 24 hours. This proportion of oil to gas will remove about 7 grains of sulphur per 100 c.ft. of gas present as thiophen, and such other sulphur compounds as are not sulphuretted hydrogen and carbon bisulphide (which were previously removed). If the carbon bisulphide had not been removed from the gas, a much larger proportion of the oil-benzole mixture would have been required.

Another procedure consists in using the benzole, or other light oil, and the stripping oil separately. In this case, the gas is first washed with the benzole and then with the stripping oil, which may be used in such proportion that the whole of the benzole taken-up by the gas from the washer containing benzole is removed from the gas, or only such portion of the benzole as is not required to remain in the gas. It is not essential that, in this procedure, the whole of the sulphur in the gas should be removed in the washer containing benzole, since any that remains will be removed by the benzole which the stripping oil will absorb.

An obvious modification is to use stripping oil containing benzole in excess of the proportion which is in equilibrium with the gas as the first washing agent, and to remove the benzole taken up by the gas from this agent by washing the gas with stripping oil substantially free from benzole.

It is not essential that the stripping oil and light oil should be mixed before they enter the washer. Instead, stripping oil free from benzole may be introduced into the washer and benzole vapour introduced into the gas entering the washer.

Creosote oil is the stripping oil preferred for this invention; but other suitable oil, such as paraffin oil, may be used—particularly if finely subdivided solid material, such as alumina or charcoal, be suspended in it.

If the oil used is inert towards sulphuric acid under the conditions suitable for sulphonating thiophen, the thiophen may be removed from the oil-benzole mixture without previous separation of the oil—such as by treating the mixture at 30° to 90° C. with sulphuric acid of 60 to 85 p.ct. strength, and subsequently separating the sulphuric acid containing the thiophen. A suitable inert oil may be made by treating paraffin oil suitable for use as a stripping oil with sulphuric acid of the said strength.

If the benzole and thiophen are distilled from the oil, the vapours may be passed through sulphuric acid of the said strength and temperature to absorb the thiophen, whereupon the benzole vapour may be condensed for re-use.

It will be seen that since the stripping oil and benzole can be purified for re-use, the process becomes cyclic. If during each cycle of the stripping oil this is heated in steam to remove naphthalene in the known manner, the naphthalene removal may be combined with thiopen removal.

MISCELLANEOUS NEWS.

BRITISH GAS LIGHT COMPANY, LTD.

The Annual General Meeting of the Company was held on Wednesday last, at the London Offices, No. 11, George Yard, Lombard Street—Mr. HENRY WOODALL in the chair.

The SECRETARY (Mr. A. W. BROOKES) read the notice convening the meeting, and the report of the Auditors; also the report referring to the Norwich station. The Directors' report and the statement of accounts were taken as read.

The CHAIRMAN, on rising, remarked that this, as the proprietors knew, was the first annual meeting of the Company, and it would, under the old order of things, have been their 196th half-yearly meeting.

A CHANGE IN THE DIRECTORATE.

He regretted that the first announcement he had to make to them was that Mr. Robert Gardiner, acting under medical advice, had retired from the Board. They all knew how long and how well Mr. Gardiner served the Company, and would share the regret of the Board in losing his services. They could only wish him long enjoyment of well-earned rest. Mr. Henry Pullman had been appointed to fill the vacancy; and he (the Chairman) later in the meeting would have the pleasure of proposing his re-election.

A SATISFACTORY INCREASE IN BUSINESS.

The accounts which they had before them were, in the circumstances, satisfactory. The Board were glad that they had now an annual account, as the last half year, in which the deplorable coal strike occurred, had been a poor one; and he thought the proprietors would agree that it was an advantage to spread the accounts over the longer period of twelve months, so that extraordinary fluctuations were the less marked. The business showed a gratifying increase of nearly 4½ p.ct., and still continued to grow—a most important factor in the prosperity of any undertaking.

ORDERS UNDER THE GAS REGULATION ACT.

As he foreshadowed when they met last year, it had been found impossible to grant the Orders under the Gas Regulation Act very rapidly. He made no complaint of this, as he felt sure that the Board of Trade had done their best to get through the great mass of work which the granting of these Orders entailed; but owing to this fact, the Company had been unable to increase the price of gas to meet the increased cost of production. He only wished, as he said last year, that companies could have been given power by a General Order to raise the price to some extent—the exact amount to be fixed after figures had been thoroughly examined by the authorities. He was glad to say that the Orders in the case of two of the Company's larger stations—Norwich and the Potteries—had now been granted, that for Norwich on Aug. 4, and for the Potteries on Aug. 26 last. Of course, the extra price did not come into the year he was now dealing with. In the case of Norwich, the maximum price was increased by the equivalent of 2s. 3½d. per 1000 c.ft., and at the Potteries by 1s. 7d. per 1000 c.ft. The proprietors were aware that the Company had to charge now by the therm; but the figures he had just given were comparative. Advantage was immediately taken of the power granted under these Orders; and at both stations they had increased the price, but not to the maximum amount allowed. Application had been made for Orders for Trowbridge and Holywell, which would no doubt be granted shortly. At Hull no Order had been applied for, as at that station the price was sufficiently elastic to meet the situation.

COST OF FOREIGN COAL.

When he told them that wages had increased during the year by £55,327, and coal had cost £86,124 more, he thought the proprietors would agree that they could congratulate themselves on the fact that they were able to pay the 10 p.ct. dividend to which they had been accustomed for some time, and only reduce the carry-forward from £68,000 to £56,000—or by £12,000. Had it not been for the necessity of using foreign coal during the coal strike, which cost them £17,000 more than the normal, they would have been well able to pay their way. During the year, in addition to the two Orders under the Gas Regulation Act, they had obtained an Order for the Norwich undertaking under the Public Utility Companies (Capital Issues) Act, 1920, enabling them to increase the interest on their unissued balance from 6 to 7½ p.ct.—a very useful provision. Further, they had been successful, under section 10 of the Gas Regulation Act, in obtaining the Staffordshire Potteries Gas Order, 1921, by which they could expend a further sum of £250,000—namely £150,000 out of ordinary capital upon which a profit of 10 p.ct. could be divided, and £100 000 out of borrowed money bearing interest at 7½ p.ct. The work in connection with these Orders had been very heavy, and had been carried out by the Secretary, Mr. Brookes, and his staff in a most efficient manner. ["Hear, hear."] His only reference to the works was to say that at all of them they had spent large sums on deferred renewals; and they were in good condition, though they had not yet completed the extensions and renewals which they were unable properly to deal with during the years of war. They had completed some time ago the water-gas plants at the Potteries and Trowbridge; and these proved most useful during the coal strike, and saved them a very large sum of money which, but for their aid, they would have had to spend on imported coal. At Norwich the new works were progressing well; and when they were completed, the Norwich station would be one of the best equipped in the country.

A STRIKE AT NORWICH.

He regretted that at Norwich, in May last, they had a strike, owing to the refusal of some of the men to unload foreign coal. The men acted most hastily and unwisely; and Mr. Thomas Glover (their Manager) had the support of his neighbours and many of the citizens of Norwich. With their generous help, and the splendid efforts of the staff, the work was carried on without interruption, in spite of the fact that practically all the men left work. The Directors valued highly the

way in which a very difficult situation was met and overcome; and he need hardly say that they had shown practically their appreciation of the work of the staff and their good friends from outside. The strike, which lasted seventeen days, was a serious one; but he hoped and believed it would tend to a better understanding in the future.

THE POTTERIES UNDERTAKING.

The shareholders would have seen from the report that the County Borough of Stoke were still desirous of acquiring the Company's Potteries undertaking; and they, the Board, would ask the proprietors to empower them to part with the undertaking if, in the opinion of the Directors, an adequate offer was made. The Board had received deputations from the county borough, and had throughout maintained that they were not desirous of parting with their undertaking. At the same time, the discussions had been of a very friendly character; and the Gas Committee had dealt with all the questions involved in a most straightforward manner. The Directors felt that, if the Local Authorities were prepared to pay a fair price for the undertaking, it was preferable that the transfer should be made by agreement rather than by possible compulsion. The shareholders would, he was sure, realize that at this stage it would be unwise to go into details; and he hoped they would unanimously pass the resolution which would be submitted to them, showing thereby their confidence in the Directors' care of their interests.

SHARE QUOTATIONS AND SOME SOUND ADVICE.

He had no doubt that some of them were surprised at the low price at which the Company's shares had been, and still were, quoted. One of the reasons for this was that there was very little business done in their shares; but the Stock Exchange quotations did not, in his opinion, indicate their real value. There had been a very healthy rise in gas stocks lately; and he strongly recommended the shareholders in the Company to hold their shares. Everything depended on the prosperity of the country as a whole; but, given reasonable trade development, the Company's position could not fail to improve. It was always dangerous to prophesy; but he thought he should fail in his duty if he did not point this out to the shareholders. He much regretted to inform them of the death of their Solicitor, Mr. Mannings, which occurred in November of last year. Mr. Mannings was a familiar figure at their meetings, and acted for the Company for nearly forty years. It was sad to think this long association was ended. Mr. Harold Hargrove had taken Mr. Mannings' place; and the Company had been very fortunate in obtaining his services. The Board had had to call upon him a great deal in connection with the various Orders applied for, and other matters; and he had served them to their great content. One other matter he must refer to—namely, that their tenancy of the present building, which they had occupied for nearly a hundred years, would shortly terminate; and this was probably the last time they would meet together there. The Directors had been looking out for suitable premises, and had every reason to hope they would shortly obtain what they required.

A NOTE OF CONFIDENCE.

In conclusion, he might say that the Board had every confidence in the undertaking, and in the future of the gas industry. They had excellent works; and, even more important, a first-rate staff, all working together for the common good. With regard to labour, he believed that the overwhelming majority of their men were satisfied with their conditions, and were loyal to the Company. There was no doubt that the regular employment their men had was recognized by them as a great asset. At this time, when there was so much unemployment and there were so many good men who could not obtain regular work, the Company's service was certainly one not to be despised. Another reason why there was so little unrest among gas-workers generally was that there could be no feeling on their part that the proprietors were taking an undue share of profit. The total cost of capital in their own undertaking was less than 6 p.ct. Viewing the whole situation, they were justified in looking forward to the future with confidence. He concluded by moving the adoption of the report and accounts.

Mr. FREDERICK WILKIN seconded the resolution, which was unanimously carried without discussion.

THE DIVIDEND.

Moved by the CHAIRMAN, and seconded by Mr. WILKIN, it was agreed: "That the payment by the Directors of the dividend at the rate of 7 p.ct. per annum on the cumulative preference shares of the Company, as mentioned in their report of Sept. 12, be confirmed."

The CHAIRMAN then proposed that the payment of an interim dividend at the rate of 5 p.ct. on the ordinary shares be confirmed, and that a final dividend at the rate of 5 p.ct. (less income-tax), making 10 p.ct. for the year, be declared.

Major-General WILLIAM T. CORRIE seconded this; and it was agreed to.

PROPOSED SALE OF THE POTTERIES STATION.

The CHAIRMAN next proposed: "That the Directors be empowered (*a*) to proceed with the negotiations for the sale to the County Borough of Stoke-on-Trent of the Potteries undertaking of the Company, and (*b*) to take the necessary steps to carry the sale into effect should the terms offered by the County Borough be considered adequate by the Board of Directors." He pointed out that he had said in his speech that this was a rather delicate matter now to say much about; but he very much hoped that the shareholders would pass the resolution unanimously.

This they did, after it had been formally seconded by Mr. WILKIN.

RE-ELECTIONS.

The CHAIRMAN, in proposing the re-election as a Director of Mr. Henry Pullman, J.P., remarked that this gentleman had long been a shareholder in the Company; and in addition to his knowledge of the gas business, he had large financial interests. His assistance and advice were always freely given to the Company, and were greatly appreciated by the Board.

Mr. L. R. ABBEY-WILLIAMS seconded the proposal, which was carried.

Mr. PULLMAN said he was extremely obliged to the Chairman for the kind terms in which he had alluded to him, and to the shareholders for the unanimous support they had given to the resolution. It would always be a pleasure to him to use his best endeavours to merit the confidence they had placed in him.

The CHAIRMAN proposed the re-election of Major-General Corrie; remarking that he had been a Director of the Company for 28 years, and they hoped they would long continue to have him as a colleague. His knowledge of the undertaking was very great; and he regularly attended the meetings.

The motion was seconded by Mr. WILKIN, passed, and briefly acknowledged by Major-General CORRIE.

Proposed by Mr. KENNETH R. MACKAY, and seconded by Mr. CHARLES A. MORGAN, Mr. E. Knowles Corrie was re-elected Auditor; while Mr. William Cash was similarly re appointed, on the motion of Lieut.-Col. W. F. T. CORRIE, seconded by Mr. MORGAN.

VOTES OF THANKS.

Mr. W. J. LIBERTY moved that the heartiest thanks of the meeting be given to the Chairman and Directors for their able management of the Company's business during the past year. He said he was very pleased to notice in the report that Hull was doing well for them. It was the third port of the kingdom, and was still growing; and it spoke well for the Company that they had got Hull as one of their stations. Its potentiality was very great; and the excellent management they had down there (with which he had been brought in contact during the war) promised well for the future. There was a huge demand in Hull for housing accommodation; and when they could go full steam ahead with providing this, the Company, of course, would benefit. He was glad also to learn that the Company were going on to the therm basis, which was a far more satisfactory one.

Mr. MACKAY seconded the proposition, which was heartily passed.

The CHAIRMAN, in acknowledgment, said they had undoubtedly had a strenuous time; but it had been interesting. He hoped they would have a more satisfactory report to give to the shareholders next year than that for the past twelve months, though he did not think there was anything to complain about on the present occasion. He then proposed a very hearty vote of thanks to the Secretary, officers, staff, and workmen of the Company. After what he had said in his speech, shareholders would realize that the past year had been one of many difficulties and great strain for those who served them. They knew, of course, that they had always been well served; but a test was very useful at times, and the past year had provided an excellent one. The machine had proved well able to bear the strain all round. When they reflected upon the long duration of the coal strike, and upon the poor material that they had had to use, it was very creditable to everybody concerned to know that in no case had they failed in the supplying of gas. The foreign coal, besides being very costly, was difficult in some cases to carbonize; and it made the work extremely arduous. During this past year they had, he thought, had more reason than ever to be thankful to their staff and workpeople. As Chairman, he had had a certain amount of work to do; but it had been pleasant and easily borne, because of the loyal and excellent service which he had experienced on every hand.

Mr. HAROLD G. PALMER, who seconded, declared that the Chairman had not in any way overstated the good work done by their Secretary. In spite of occasional illness, from which he sometimes returned to work too soon, Mr. Brookes had been indefatigable; and they were glad to know he was about to take a holiday, from which it was to be hoped he would return fully restored to health, so that they might enjoy his services for many years to come.

Mr. LIBERTY said that, knowing something of the extra work the past year had involved, he would like to be associated with the vote.

The resolution having been heartily passed,

Mr. BROOKES said it was a great pleasure to acknowledge the vote; and it would be a further pleasure to communicate it to those concerned. This recognition of their services was highly appreciated by all connected with the Company.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

Half-Yearly Meeting.

The Half-Yearly Meeting of the Alliance and Dublin Consumers' Gas Company was held on Thursday last in the office, D'Olier Street, Dublin—Mr. JOHN MURPHY presiding.

CHAIRMAN'S ADDRESS.

The CHAIRMAN, in moving the adoption of the report (which was given in the "JOURNAL" for Sept. 21, p. 667) and statement of accounts for the half year ended June 30, said that though the margin of profit earned was small when compared with the total receipts, yet, in existing circumstances, and bearing in mind the limitation placed on the dividend, the figures would not, he hoped, be regarded as unsatisfactory. On this occasion, expenditure on capital account had not been heavy, although he was glad to say nothing of an essential nature had had to be postponed. The actual sum expended amounted to £3207; while they had written-off the larger figure of £5695—thus reducing the total expenditure by £2488. The revenue account showed that the cost of their two principal raw materials, coal and oil, had advanced considerably when compared with a year ago, and, unfortunately, on this occasion there was no compensating advantage in the shape of increased receipts for coke and breeze. The actual increase under coal and oil amounted to no less than £27,165. The cause of this was almost entirely attributable to the miners' strike. During the strike period their primary duty was to economize coal; and in order to accomplish this, they were obliged to use larger supplies of oil, which automatically increased their manufacturing costs. Secondly, their steamers were kept in idleness for the three months; thus substantially reducing the profit usually derived from working them. When the strike occurred, coal stocks were about at their customary level; and, although no coal was received from April 2 until after June 30, the gas supply was maintained throughout without reduction

of pressure. This justified the policy they had striven to adopt for several years in carrying adequate stocks of coal. As a result of conserving their available fuel supplies during the currency of the strike, 9204 tons less coal was carbonized, and the make of coke was correspondingly reduced. Receipts from coke and breeze were, therefore, down by nearly £15,000—not so much on account of any fall in price, but by reason of the reduced quantity available for sale. The tar figures were very satisfactory, showing an increase of a little over £6000 when compared with 1920. Since the close of the half year, however, prices had fallen; and it was improbable that their income would ever again reach so high a figure. The income from sulphate of ammonia had fallen considerably, and amounted to very little more than one-quarter of that of the corresponding period. If prices continued to decline, it would be a matter for consideration as to whether the conversion of their ammoniacal liquor into sulphate of ammonia should not be discontinued. None of the other items relating to manufacture called for any special comment, except, possibly, the charge for repair and maintenance of works, which, although down by £3792, was still a heavy item, and must, he feared, continue to be so until such time as the essential renewals, which were still in progress, had been completed. The contracts for renewing their purifiers, tar extractor and washer scrubber, and condensers had recently been finished; and it was hoped that their Glover-West vertical retort installation would be working before the close of the current half year. In connection with distribution, a good deal of main and service renewal work was carried out during the half year, with the consequence that expenditure under this head was up by £9188. A number of the smaller mains, laid many years ago, were found on examination to require relaying; and the result of carrying out this work appeared to have amply justified the expenditure, by reason of the fact that many of the consumers had been afforded an improved supply. The cost of repairing and renewing meters was less by £3165. In connection with the lighting and maintenance of the public lamps, a small profit had again been realized, although, owing to increased costs, the credit was much smaller than on the previous occasion. Rates and taxes, as might be expected, showed a still further increase of approximately 16 p.ct.; but they hoped that high-water mark in this connection had now been reached. The cost of management was higher to the extent of £1300, which could be traced to the increases under the heads of establishment charges and collection of accounts. Under the heading of miscellaneous and special charges there was nothing exceptional, unless it be the cost of war bonus, which showed an increase of £10,843. The actual amount of this expenditure reached the huge total of £55,438, and represented 1s. 6d. per 1000 c.ft. on the present price of gas. The sales of gas, to ordinary and prepayment consumers, were down, compared with the corresponding period, by approximately 5 p.ct. The quantity of gas sold for public lighting, although still small, was larger by 50 p.ct. than it was a year ago. On the whole, however, the total sales had fallen by 31 million c.ft.; but the net receipts were higher by £54,501, on account of their securing the full benefit of the increase in price which came into operation on July 1 last year. The rental figures, which related to their ordinary consumers, showed a satisfactory increase; but, of course, the prepayment total was down, on account of the reduced consumption previously referred to. In the net revenue account, bank interest had rather more than doubled. However, after providing for interest on temporary loans, debenture interest, and allowing for the credit on income-tax account, the dividend of £3 6s. 3d. p.ct. could be met on this occasion without encroaching on the carry-forward from the previous half year. With regard to the general balance-sheet, their funds showed a slight increase of, roughly, £2500; while the amount due to bankers and sundry creditors was larger by about £12,500. On the other hand, the value of stocks had fallen by approximately £25,000; but accounts due to the Company were greater by £22,000. The Company's new steamer was successfully launched on Aug. 5. All the latest improvements in this type of coaster had been provided for; and they were hoping she would make her trial trip next month, and prove satisfactory in every way. The application for an Order under the Gas Regulation Act was heard in London on May 25 last, when the objections raised by the local authorities were given the fullest consideration. They had just heard some particulars of the revised terms. The old standard price was 3s. 7d. per 1000 c.ft., and, after the declared date, this would be altered to 1s. 7d. per therm, which was about the equivalent of 7s. 1½d. per 1000 c.ft., or some 4½d. per 1000 c.ft. less than the price they were obliged to charge now. They were precluded, of course, from paying the standard dividend of 5 p.ct. per annum until such time as the price of gas could be reduced to a standard of 1s. 7d. per therm (or 7s. 1½d. per 1000 c.ft.).

The motion was seconded by Mr. Jeremiah MacVeagh, M.P.

Mr. O'Brien Kennedy raised the point as to whether the Directors could not pay the dividend free of income-tax.

The Secretary (Mr. W. J. Grey) explained that the Directors were precluded by statute from paying dividends free of tax.

The motion was then adopted.

On the motion of the Chairman, seconded by Mr. Augustine Bond, a dividend at the rate of £3 6s. 3d. p.ct. per annum, less income-tax, on the consolidated ordinary stock, was passed.

The proceedings concluded with a cordial vote of thanks to the Directors and staff for their efficiency and zeal.

Safeguarding of Industries Act.—More than thirty pages of the "London Gazette," dated the 27th ult., are occupied by lists of articles chargeable with duty under Part I. of the Safeguarding of Industries Act. These include optical glass and optical elements, whether finished or not; optical instruments; scientific glassware; laboratory porcelain; scientific instruments; gauges and measuring instruments of precision; compounds of thorium, cerium, and the other rare earth metals; and synthethic organic chemicals (other than synthetic organic dyestuffs, colours, and colouring matters imported for use as such, and organic intermediate products imported for their manufacture), analytical re-agents, all other fine chemicals (except sulphate of quinine of vegetable origin), and chemicals manufactured by fermentation processes.

RAILWAY CLASSIFICATION OF COAL AND COKE.

The Rates Advisory Committee of the Ministry of Transport give notice that the railway companies have lodged proposals in regard to a new classification for:

(1) Coal, coke, and patent fuel.
(2) Returned empties.

Copies of such proposals may be obtained from the Railway Clearing House, Seymour Street, Euston Square, London, N.W. 1.

Any person or association desiring to take objection to such proposals or any part of them must lodge four copies of their detailed objections with the Secretary, Rates Advisory Committee, Gwydyr House, Whitehall:

(i) in regard to coal, coke, and patent fuel, not later than Monday, Oct. 10.
(ii) in regard to returned empties, not later than Monday, Oct. 17.

The question of the amount of the rates to be charged is not now under consideration; and objections (if any) must be confined to questions relating to the principles of the respective classifications.

A public meeting will be held by the Rates Advisory Committee at 11 a.m. on Tuesday, Oct. 25, in the Old Hall, Lincoln's Inn, W.C., to consider the railway companies' proposals as to coal, coke, and patent fuel, and the objections thereto.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" of applications by gas undertakings to the Board of Trade for Orders under section 1 of the Gas Regulation Act.

Bromsgrove Gas Light and Coke Company.

The standard price now authorized in respect of the supply of gas by the undertakers is 4s. 4d. per 1000 c.ft., subject to a sliding-scale; and the price they have asked the Board of Trade to substitute for this is 1s. 8d. per therm.

Gowerton Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. 9d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 6d. per therm.

Haslingden Union Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. 9d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 8d. per therm

Staveley Gas Light and Coke Company, Ltd.

The standard price now authorized in respect of the supply of gas by the undertakers is 4s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 2s. 1d. per therm.

DECLARATIONS OF CALORIFIC POWER.

Derby Gas Light and Coke Company.—480 B.Th.U. (Oct. 1.)
Houghton-le-Spring District Gas Company.—520 B.Th.U. (Oct. 1)
Reading Gas Company.—460 B.Th.U. (Sept. 30.)
Spenborough Urban District Council.—From the Cleckheaton works, 430 B.Th.U.; from the Heckmondwike works, 450 B.Th.U.; from the Gomersal works, 550 B.Th.U. (Oct. 1.)
Wisbech Lighting Company.—480 B.Th.U. (Dec. 1.)

GAS REGULATION ACT ORDERS.

The Director of Gas Administration has forwarded copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Alliance and Dublin Consumers' Gas Company.

After the declared date, the standard price in respect of gas supplied by the undertakers shall be 19d. per therm.

For the purpose of ascertaining the authorized rate of dividend for the half year in which the declared date occurs, the price charged per 1000 c.ft. during that part of the half year (if any) before the declared date shall be rendered into the equivalent price per therm by dividing it by four-and-one-half.

After the declared date, the sums of 0·6d., 1·2d., and 2·8d. per therm shall be substituted respectively for the sums of 3d., 6d., and 1s. 2d. per 1000 c.ft. mentioned in sub-section (2) of section 16 (price and sliding-scale as to dividend) of the Alliance and Dublin Gas Act, 1909.

After the declared date, "therm" shall be substituted for 1000 c.ft. in section 44 (price of gas for public lamps) of the Alliance and Dublin Gas Act, 1909.

Prepayment clauses are included. (Sept. 29.)

Harwich Gas and Coke Company.

As from the declared date—(1) the maximum price in respect of gas supplied by the undertakers shall be 22d. per therm; and (2) the words "one-half of a therm" shall be substituted for 100 c.ft. in section 12 (price of gas) of the Harwich Gas Order, 1874. (Sept. 29.)

Reading Gas Company.

As from the declared date: (1) the maximum price in respect of gas supplied by the undertakers within the borough of Reading shall be 15·4d. per therm; and (2) the following table shall be substituted for

the table appearing in section 31 (limit of price of gas) of the Reading Gas Act, 1880 :

—	First Column.	Second Column.	Third Column.
	Pence per Therm.	Pence per Therm.	Pence per Therm.
To consumers of less than 100 therms half yearly.	15·4	19·0	19 6
To consumers of 100 but less than 200 therms half yearly . . .	15·4	18·4	19·0
To consumers of 200 therms or upwards half yearly	15·4	17·8	18·4
For gas supplied to public lamps .	14·6	17·0	17·6

The Order came into operation on Sept. 23.

Wexford Gas Consumers' Company, Ltd

After the declared date: (1) The standard price in respect of gas supplied by the undertakers shall be 18·6d. per therm; and (2) the price of 17·4d. per therm shall be substituted for the price of 2s. 10d. per 1000 c.ft. wherever it occurs in section 26 (fixing maximum price of gas with sliding-scale as to dividend) of the Wexford Gas Order, 1903.

For the purpose of ascertaining the authorized rate of dividend for the year in which the declared date occurs, the price charged per 1000 c.ft. during that part of the year (if any) before the declared date shall be rendered into the equivalent price per therm by dividing it by five. (Sept. 27.)

SULPHATE OF AMMONIA PRICES.

For November and December Delivery.

In a circular to merchants signed by the Chairman (Mr. D. Milne Watson), the British Sulphate of Ammonia Federation, Ltd., announce their prices for sulphate of ammonia for November and December delivery. Prices for subsequent months will be announced later.

The Federation are prepared to book orders during the two months named at the prices mentioned below, until Oct. 15, after which date orders will only be accepted "subject unsold," and fresh prices may be substituted.

For November Delivery—

£14 18s. per ton for neutral quality, in fine friable condition, free from lumps, containing 25¾ p.ct. ammonia.
£13 15s. per ton for ordinary quality, containing 25¼ p.ct. ammonia.

For December Delivery—

£15 3s. per ton for neutral quality, as above described.
£14 per ton for ordinary quality, ,, ,,

The allowance for taking delivery *ex* works by road vehicle is raised to 10s. per ton for November and December delivery.

BRADFORD CORPORATION GAS DEPARTMENT.

The following is the report by the Gas Engineer and Manager (Mr. Charles Wood, F.C.S.) upon the working of the Gas Department for the year ended March 31, and presented to the Gas Committee on the 16th ult.

In presenting my annual report this year, I beg to state that the period under review has been a time of great anxiety for gas undertakings. The cost of almost every kind of material used increased enormously; while wages and salaries have necessarily been considerably advanced.

Bradford is one of the few places where the price of gas was not advanced during the year; consequently making it more difficult for us to meet working expenses. The gross revenue for the year amounted to £719,369, and the expenditure to £642,689, showing a gross profit of £76,680. The following charges had also to be met: Interest on loans £41,341, contribution to sinking fund £13,520, income-tax £27,000—a total of £81,861, leaving a loss on the year's working of £5181.

Compared with the figures for the preceding year, these amounts show that the gross revenue increased by £94,826; the gross expenditure, by £136,620; the charges for interest on loans, sinking fund, and income-tax, by £18,468; and that the net loss was £5181, as against last year's profit of £55,081. When compared with the year 1914, the gross revenue shows an increase of 119 p.ct., and the gross expenditure an increase of 137 p.ct. The deficit in the net revenue appropriation account has now been increased to £8181.

No capital expenditure was incurred during the year; but on the completion of the conveyance of a small plot of land adjoining the Valley Road works, the capital account was credited with £672. The total expenditure on capital to the end of the year was £1,290,357; and the amount outstanding, £644,108—£646,249 having been provided for the redemption of loans.

The statement of income showed that gas yielded £416,024, or £46,328 more than the previous year. This increase is attributable to the operation for the whole of the year of the present charges—the previous year having benefited for six months only.

It is regretted that, owing to the general decline in trade in the city, the total quantity of gas sold during the year showed a decrease on the previous year. The output for the first nine months was above the previous figures; but the yearly total of 1,873,659,000 c.ft. was 20,580,000 c.ft. less than 1920, or a decrease of 1·08 p.ct.

The following table shows the quantities of gas sold (with the increase or decrease compared with the previous year's output) for the last few years :

	Gas Sold. Thousands.	Gas Sold. Increase or Decrease P.Ct.
1914	2,100,495	1·72 increase.
1915	2,043,661	2·70 decrease.
1916	1,808,980	11·48 decrease.
1917	1,833,171	1·33 increase.
1918	1,813,618	1·06 decrease.
1919	1,781,584	1·76 decrease.
1920	1,894,239	6·32 increase.
1921	1,873,659	1·08 decrease.

The quantity of gas made was 2,054,231,000 c.ft., as compared with 2,081,390,000 c.ft. during the preceding year—a decrease of 27,159,000 c.ft., or 1·30 p.ct. The make per ton of coal has fallen to 12,863 c.ft.; but a better average quality has been supplied.

Coke realized £29,328 more; the total receipts, after deducting the cost of handling and carting, being £123,687, or an average price per ton of 34s. 1·77d. The quantity produced for sale was 72,443 tons, or 9·07 cwt. per ton of coal. The value of the coke was enhanced by the increased prices of coal. The selling price was raised from 36s. to 40s. in May, and to 42s. 6d. in September. The present price is 40s.—a reduction of 2s. 6d. per ton becoming operative in February last. Following the now established custom, the whole output has been sold locally, notwithstanding that during the major portion of the year very much better prices could have been obtained for export.

The receipts for tar showed an increase of £11,640; and the quantity produced was 8848 tons, or 10·80 gallons per ton. Under the terms of the contract, the undertaking derives advantage when the market values of pitch and the other contents of tar improve. As during the first eight months of the year the demands for these products were good, it was possible to obtain favourable prices for the output; but during the last four months of the year the demand fell off, and prices decreased. The accounts also include the final adjustment for the quantity of pitch retained from the tar produced during the war years; and the undertaking has altogether received £27,670 more than would have been realized had the tar been sold at the maximum market prices during the period of production.

The revenue from ammoniacal liquor, of which 23,038 tons were produced, or 31·52 gallons per ton of coal, was slightly less than the previous year—viz., £14,808, against £14,871. The values of ammonia products followed the general trend, and during the last months of the year rapidly fell away from the high figures realized in the earlier part of the year.

The benzole extraction plant has been very little in operation during the year. It was more economical to retain the benzole in the gas; and therefore the sales and receipts for this product are less than in former years.

The gross profit on the chemical works account has risen from £5684 in 1920 to £6835.

The statement of expenditure shows that, on all important items, increases have had to be met. The costs of all materials used throughout the undertaking were subjected to frequent advances during the early part of the year; and any decrease in costs came too late to be noticeable in the accounts.

The largest item of expenditure—that for coal—increased by £77,820; the total cost of the quantity carbonized (including carriage and handling charges) being £301,834, or an average of 37s. 9·62d. per ton, against £224,014, or an average of 29s. 3 37d. per ton the previous year. The increase is attributable to the all-round advance of 4s. 2d. per ton in May, 1920, together with the increased charges for carriage and wagon hire, which were brought into operation in January and September. During the year, 177,692 tons were purchased and 159,692 tons carbonized; while the stock at the end of the period was 32,158 tons, compared with 14,158 tons at the commencement.

Supplies of coal were more plentiful during the year, although for the greater part of the time it was necessary to take delivery of considerable quantities from the North to compensate for the restricted supplies from Yorkshire collieries. By January larger deliveries of better Yorkshire coal were received; and therefore the Committee were able to persuade the Mines Department to divert the Durham coal to other undertakings who were more in need of it. They also took the opportunity to restrict deliveries of the less suitable qualities of Yorkshire coal. An analysis of the coal received shows that 67 p.ct. came from West Yorkshire, 16 p.ct. from South Yorkshire, and 17 p.ct. from Durham.

The stoppage of mines during October necessitated the taking of 10,000 tons of coal from stock and replenishing later; and the costs for the year were increased by the expenditure thus incurred. Writing at this date, the October stoppage appears quite a small matter compared with the protracted stoppage of April-June of this year; and the provision of ample stocks during the year under review has been abundantly justified by the requirements that followed.

The item for repairs and maintenance of works and plant showed an increase of £14,613. Following the usual custom, the whole of the plant was overhauled and brought up to the ordinary standard of efficiency prior to meeting the winter demand. The installation of the additional washer-scrubber for ammonia extraction at the Birkshall works proceeded; but it was not completed until recently. Therefore the cost will be a capital charge against the current year. The Thornton Road and Birkshall vertical plants are giving satisfactory results, and were in continuous use throughout the year.

Repairs, &c., to mains and services required the expenditure of £31,827, or £10,859 more than during 1920. All this expense has been charged against revenue. It has again been necessary, in order to improve the supply of gas, to lay considerable lengths of new main—in many cases in lieu of old service pipes; and although the prices of pipes and castings did not show any reduction until the last quarter of the year, these materials were easier to obtain from the makers. The mileage of mains at March 31 was 479.

Carbonizing wages cost £11,284 more; repairs and maintenance of meters, £358 more; meter inspection, £2263 more; salaries, £4522

more; while rates and taxes showed an increase of £8113 over the previous year.

All sections of the employees have benefited by further increases of pay during the year; and the total wages paid is £46,214 more than in the previous year, and £134,264 more than the amount paid in 1914. The National Regional and Trade Agreements respecting rates and conditions have been observed; and the only friction with employees arose in July last year, when, though contrary to the instructions of their union, the gas-workers left the works. Wiser counsel soon prevailed, however, and the difficulty was quickly overcome; the plant working normally within thirty-six hours from the commencement of the stoppage. Very little inconvenience was experienced by the public. During the now current year, and following other branches of industry, agreed reductions in wages have operated, and negotiations are at present taking place with the object of arriving at a satisfactory basis for regulating the wages of gas-workers.

During the year further progress towards bringing the street lighting up to the pre-war standard was possible; and as the Corporation were able to obtain the necessary lamp-tops, they were immediately fitted, and the lamps lighted. The number of lamps lighted was 11,965, as compared with 13,030 in 1914. The remainder have since been completed, and can now be used as required. The gas used for street lighting during the year was 148,320,000 c.ft., or 26 millions less than was used in 1914; and the actual cost was £84,310, of which £81,159 has been credited to the Gas Department by the Finance Committee.

The sales through the Darley Street showrooms have again showed satisfactory progress; the income having increased £6974, and the net cost being approximately the same as the previous year, notwithstanding increased rents, rates, &c. The premises are being kept up-to-date, with regard to the appliances displayed; but no unnecessary expense is being incurred.

CAST-IRON PIPE ASSOCIATION.

End of Control.

Under the heading of "The End of the Cast-Iron Pipe Combine," the "Ironmonger" on the 1st inst. published the following article:

After an existence of just over thirteen years, the Cast-Iron Pipe Association, which has controlled the trade in this country in cast-iron pipes for gas, water, and some sewage mains, has come to grief. It has been asserted by those connected with the business that no such Association actually existed. This may be technically true, inasmuch as the 'ring' appears never to have had a properly appointed secretary or office of its own. But it has been, nevertheless, a very potent force in the cost of municipal government during the period of its existence. Its record was investigated by a Committee appointed under the Profiteering Acts. [See "JOURNAL" for April 6, p. 41.] The findings were much in accordance with those of several other Committees which sat under the Acts. It was found that there was an effective combination in the cast-iron pipe trade; that it did fix the prices; that the practice of submitting tenders had become of no value as a protection to the ratepayer; and that the municipal authorities were more or less at the mercy of the combine. Nevertheless, the profits made by the firms whose accounts were examined by the Chief Accountant appeared to be not unreasonable. The evidence showed that one large public body paid £4 14s. 8d. per ton for 4-in. cast-iron pipe in 1906, £7 in 1914, and £23 4s. 6d. per ton in 1920. It has to be remembered that during the war effective competition from Continental works was throttled; and that after the Armistice prices advanced from £14 1s. in April, 1918, to £17 1s. in July, 1919, and to £23 4s. 6d. in December, 1920. The Belgian and French works were then in process of reorganization; and it is generally believed that during that period strong efforts were made by the British combine to obtain control of these competitors, but without success.

During the past fortnight, differences in quotations from the associated firms have been discovered by municipal authorities; a typical case being that of the Swansea Corporation Water Committee, who were in the market for 14-in. pipes. These were bought in 1911 at £4 6s. 10d. a ton. In the summer of 1914 the price had gone up to £6 19s.; and last year, when the Water Engineer was asking for tenders, the all-round price was £21. To-day there is a difference of £3 a ton in the British quotations; and the lowest price is £14 15s. Last week there was a conference in Sheffield at which the differences between the members of the combine came to a head. Exactly what was the immediate cause of the dispute between the parties has not been disclosed; but it is known that for some time past the Scottish makers have not seen eye to eye with the manufacturers in Derbyshire and Yorkshire—largely, we believe, owing to the allocation of orders for small pipes. The English makers are equipped for the manufacture of pipes up to the largest diameters, and some of them are advantageously placed because they are coalowners and possess their own blast-furnaces. The Scottish manufacturers depend on the pig-iron market for their supplies, and can only turn out pipes up to a certain size. But the real cause of the disruption is no doubt that the French manufacturers have been successfully tendering during the past year at prices at least 25 p.ct. lower than those of the British makers.

The statements made by our contemporary find corroboration in an intimation, dated Sept. 22, which is to hand from the Staveley Coal and Iron Company, Ltd., of Chesterfield, to the effect that from that date the prices of their cast-iron pipes will no longer be controlled by any Association; and they will be quoting independently of any other pipe founders. The Company have recently extended their facilities for the manufacture of small-diameter pipes up to 4 in.

A short-circuit and a fuse of electric wiring at St. Laurence's Church, Morecambe, on Sunday evening last week, startled the congregation by the blinding flash of the wire, and left them to finish the service in darkness.

LIGHTING TRADES, LTD.

In his address to the shareholders at the first annual general meeting of Lighting Trades, Ltd., the Chairman (Mr. H. J. Mitchell) briefly explained the circumstances which led to the formation of the Company. Before the war, he remarked, the development of the British gas-mantle trade was handicapped by the control which the foreign combine had of the sources of supply of monazite sand, and, in turn, of thorium nitrate. It was not surprising, therefore, that some of the leading British manufacturers turned their thoughts towards an amalgamation of interests as a means of consolidating and strengthening the position attained by them during the war. On Aug. 30, 1920, a Company was incorporated under the title of the Record Gas-Mantle Company, Ltd., which acquired the "Ironclad" gas-mantle business of Messrs. Curtis's and Harvey's, Ltd., and subsequently purchased the businesses of the Ramie Company, Ltd. (embracing the British Thorium Syndicate), and the Volker Lighting Corporation, Ltd. The Company now owned four of the seven principal mantle factories, one of the two ramie works, and of the two principal thorium factories in this country, they owned one and had a joint interest in the other. Their position had been further strengthened by the substantial interests held by them in companies who manufactured magnesia rings, and produced monazite sand; and they were to-day in the unique position, so far as incandescent mantle manufacturers were concerned (British or Continental), of producing within their own organization all the principal materials used for, and the component parts of, incandescent mantles. The original name of the Company was changed on Nov. 2, 1920, to "Lighting Trades, Ltd.," which was considered more appropriate, as their ultimate object was to handle not only gas-mantles, but also all other commodities required by users of gas lighting. The present Board included two representatives of each of the three Companies amalgamated in the undertaking. The Company were fortunate in securing, as their Managing Director, Mr. C. S. Garland, with his unique knowledge of the business and his untiring energy.

After referring to the general slump in trade, and the high costs of material and labour, the Chairman proceeded to deal with the accounts. These showed that the net profit earned for the fifteen months under review was £36,951, after meeting all charges, including full provision for depreciation. A dividend on the preference shares for six months had already been paid; and deducting this, there was left a net available balance of £28,000. The Directors recommended that the whole of this amount be carried forward; and this was agreed to.

REDHILL AND REIGATE AMALGAMATION SCHEME.

Benefit to Reigate Consumers of 3s. 7d. per 1000 C.Ft.

Receipt was intimated at the last meeting of the Reigate Town Council of a letter from the Secretary of the Redhill Gas Company (Mr. Horace Long), to the effect that, at a meeting of the Directors he had been instructed to convey to the Council their thanks for the kind manner in which they were received at a recent conference with regard to the Company's application for powers to absorb the undertaking of the Reigate Gas Company, Ltd., and their sense of satisfaction in being able to meet the views of the Corporation upon the matter. The amalgamation, now formally approved, would come into force on Oct. 1; and the Directors, in consequence of the economies which it would be possible to effect, had given notice that the price of gas throughout the borough would from that date be 15·4d. per therm. This represented a reduction of about 1d. per 1000 c.ft. in Redhill, and 3s. 7d. per 1000 c.ft. in Reigate. The Directors had further decided that, notwithstanding anything contained in section 12 of the Redhill Gas Order, 1921 (existing contracts to continue), they would voluntarily, and without prejudice, reduce the charges for the lighting of the public lamps in Reigate to those now being made in the Redhill area.

Mr. WORLEY said he thought the letter was very satisfactory; and he hoped the Council would view it in the light that they had done the right thing. He moved that it be referred to the Highways Committee.

Alderman INCE seconded, but said the fact of the charge per therm being as high as was proposed, showed that the amalgamation was not in the interests of the community.

Mr. HANDSCOMB said the sense of satisfaction could be shared with the consumers who had been in the area of the Reigate Gas Company. This Company had been paying very high dividends for many years past; and their prices to consumers had also been very high. Except for this amalgamation, there appeared to have been no escape. Under the Gas Regulation Act of last year statutory companies were bound to apply to the Board of Trade to fix such a price per therm as would correspond to the prices per 1000 c.ft. having regard to the increased cost of manufacture. The Redhill Gas Company applied for 1s. 5·6d. per therm; and the matter had been investigated by the Board of Trade, who had reduced it only 0·8d. per therm. It was only fair to the Company to state that this showed their figures and their prices were not unreasonable. As a matter of fact, the Board of Trade had given 1s. 4·8d. as a fair price per therm; but the Company were charging 1s. 3 4d.; so that they were not taking advantage of the full award.

The DEPUTY-MAYOR said the members of the Council and the community would view with a feeling of relief the fact that this amalgamation had taken place. The dividends would now be controlled by the price of gas; so this would act as an inducement to the Company to keep their prices lower.

The letter was then referred to the Highways Committee.

Tully Gas Plants, Ltd., have opened new London offices at No. 47, Victoria Street, Westminster.

TRADE NOTES.

[For "Journal" Advertisers.]

"Nico" Inverted Gas Lighting.

Prices and particulars of everything requisite for the well-known "Nico" system of inverted incandescent gas lighting are included in the new season's catalogue of the New Inverted Incandescent Gas-Lamp Company, Ltd., Nos. 19 and 21, Farringdon Avenue, E.C. For general lighting, there are the "Nico-Shell" and other patterns of burners; while for mills and factories, or any situation in which such a device is desirable, there is the "Nico-Vibra" burner, on the anti-vibrating principle. Numerous styles of high-power factory, shop, or warehouse lamps, and for outside lighting, also are illustrated. There is a ten-light cluster of "medium" burners, with only two air and gas adjusters, each controlling five burners from outside the casing. This lamp is stated to give 750 candles, with a consumption of about 18 c.ft. per hour. The "Nico" patent regulator, which can be fitted to existing burners enables the burner to be easily adjusted to suit the varying conditions of gas supply. The eccentric action of the crank on the inside cylinder of the adjuster makes it impossible for the needle to become tight. The fittings are for all purposes and in every style.

Falk, Stadelmann, and Co.'s Lighting and Heating Appliances.

A comprehensive new list of modern appliances for practically every form and character of gas lighting, is that just issued by Messrs. Falk, Stadelmann, and Co., of Farringdon Road, E.C., who are in a position to offer new designs of fittings for all kinds of purposes. There is, for instance, a series of patent ratchet adjustable brackets and pendants—particularly suitable for offices and workshops—the position of which can be altered to suit work in progress. A special swivel joint permits the free movement of the bracket arm with burner in any direction within a radius of several feet. All movements are effected by very slight pressure; and the burner remains in the exact position required. Among the semi-indirect lighting fittings, are a series of nice designs supplied with a five-light superheater cluster burner, provided with a bye-pass, and adjusted by one gas and air regulator operated from inside the bowl; all the lights being controlled from one tap. In view of the limitations of space imposed by housing schemes, special attention has been devoted to the range and style of single-light pendants. Inside and outside lighting appliances, however, numerous as they are, do not by any means fill the catalogue, which, among other sections, contains one relating to small brass gas-fittings, and another illustrating large and small gas cooking and heating apparatus.

Among the new Companies registered is Smith, Bentley, and Co., with a capital of £5000, to carry on business at Forest Hill as manufacturers of, and dealers in, gas-burners and lamps.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Oct.* 4.

The London tar products market continues quiet and without particular interest. There is little demand for pitch and the price is more or less nominal. Owing to the continued fine weather, fair quantities of tar are still being called for for road work. Creosote continues steady at about 8¼d. to 9d. per gallon. Tar spirits are in short supply, and prices are firm; pure benzole and pure toluole being about 3s. 3d. to 3s. 6d. per gallon, 95/160 solvent naphtha 3s. to 3s. 3d., and pyridine bases are quiet at about 5s. 9d. per gallon.

Sulphate of ammonia continues in good demand, and available supplies are readily taken up at the schedule prices arranged.

Tar Products in the Provinces.

Oct. 3.

The average values for gas-works products during last week were: Gas-works coal tar, 50s. to 54s. Pitch, East Coast, 65s. to 70s.; West Coast—Manchester, 60s. to 65s.; Liverpool, 60s. to 65s.; Clyde, 60s. to 65s. Benzole 90 p.ct. North, 2s. 4d. to 2s. 6d.; crude 65 p.ct. at 120° C., 1s. 11d. to 2s. naked at makers' works; 50-90 p.ct., naked, North, 2s. 3d. to 2s. 4d. Toluole, naked, North, 3s. to 3s. 1½d. nominal. Coal tar crude naphtha in bulk, North, 11d. to 11½d. Solvent naphtha, naked, North, 2s. 8d. to 2s. 9d. Heavy naphtha, North, 2s. 7d. to 2s. 9d. Creosote, in bulk, North, liquid, 8¾d. to 9d.; salty, 7¾d. to 8¼d. Heavy oils, in bulk, North, 10½d. to 11½d. Carbolic acid, 60 p.ct., 1s. 6d. Naphthalene, £20 to £30; salts, £7 to £9, bags included. Anthracene, "A" quality, 8d. to 10d. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

There is little change in the market for coal-tar products since my last report; and, taking into consideration that supplies are comparatively small, the position is very unsatisfactory. The market for pitch is becoming unsettled, and some extremely low prices have been reported lately. It is difficult to get any exact price, either on the East Coast or at Manchester, owing to lack of business; but it is somewhere between 60s. and 70s. per ton, although reports are current of 58s. having been accepted. The only satisfactory feature in the market is that very little pitch is now being made. There is a distinct improvement in the rubber manufacturing industry, which will produce a better demand in solvent naphtha—the output remaining small, of course. The latest reported quotation is 3s. 2d. to 3s. 3d. per gallon. Naphthalenes are dull without much business; crude quotations being £5 to £8 per ton, and refined £15 to £16

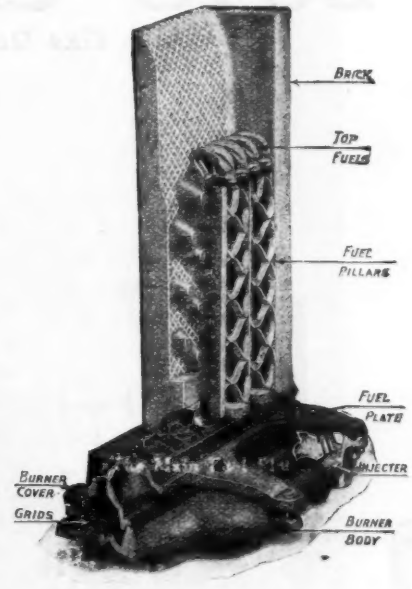
The heat generating unit is the soul of the Fire—

¶ It must be capable of the highest radiant efficiency.

¶ It must be accessible and extremely easy of maintenance.

Around such unit any good design of front may be built—

This is achieved in our "Author" Series of Gas Fires.



The Main Fuel Plate.

R. & A. MAIN, LTD.,
LONDON, FALKIRK, ETC.

per ton. Benzole 90 p.ct. is very scarce, and latest prices are 3s. per gallon on rail. Pure benzole is quoted at 3s. 6d. per gallon. Creosote is a weak market; there being many sellers at 8d. per gallon. Cresylic acid meets but small inquiry, and is quiet at 2s. 3d. for pale and 2s. 1d. for dark qualities. There is hardly any business in carbolic acid, and apparently it is not being extracted, because the operation does not pay. The latest value of crystals is nominally 6d. per lb. Business in intermediate products remains quiet, and trade appears to be slightly reviving. Aniline oil and salts meet small, but steady, business at 1s. 7d. and 1s. 8d. per lb. respectively. Salicylic acid continues firm at 1s. 4d. per lb. Resorcin, technical grade, is 5s. 6d. per lb., beta-naphthol 2s. 6d. per lb., and anthracene, 40-50 p.ct., 9d. per unit.

Sulphate of Ammonia.

Business in this product has quieted down again; the demand on home account being small. Export trade, however, is fairly steady, and producers are hopeful that this branch of the business will extend. Japan is in the market again, and Spain and the Canaries are also substantial buyers; while the latest information from France suggests that that country may come in shortly as a substantial buyer. Export value remains in the neighbourhood of £16 per ton. Prices for delivery at home during October are: Neutral quality, 25⅝ p.ct., £14 15s.; ordinary quality, 25¼ p.ct., £13 10s. Quotations for November delivery are 5s. per ton more than for October in each case, and another 5s. per ton additional in each case for December. Other terms and conditions are as previously announced, except that the allowance for delivery *ex*-works by road vehicle is raised to 10s. per ton for November and December delivery. Manufacturers will do their best to meet buyers' wishes with regard to the quality to be supplied, but reserve the right to deliver either neutral or ordinary quality at their option, at the prices quoted for each of these grades.

Radcliffe Gas Supply.—The Radcliffe and Pilkington Gas Company went out of existence on the 1st inst.; the concern passing into the hands of the Radcliffe and Little Lever Joint Board. The Company, who obtained their powers seventy years ago, covered a very large area, extending almost from the Salford boundary to villages adjacent to Bolton. Prestwich and Whitefield declined to join in the Gas Board.

Welshpool Gas Company.—At the annual meeting of the Company, Mr. Yearsley (the Deputy-Chairman) said that, for the first time in their history, they were unable to declare a dividend. On the profit and loss account there was a balance on the year's working of only £157; and this it was proposed to carry forward. Throughout the coal stoppage, however, their customers were never without light or heat; and he thought the community were indebted to them for the way they "kept the flag flying."

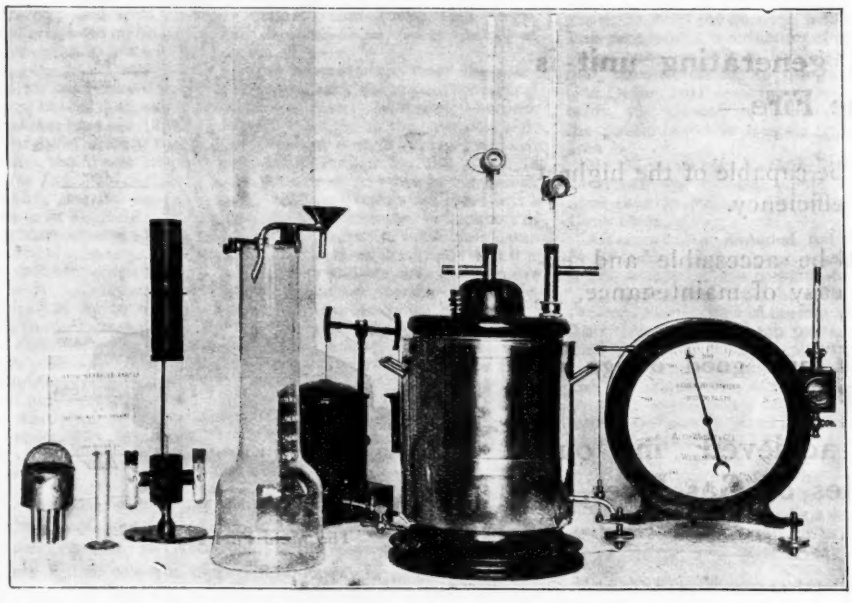
Dual Supplies Not Favoured for Housing.

The Housing Committee of the Leyton Urban District Council, with regard to the lighting of their municipal houses, report having a letter from the Assistant Secretary to the Ministry of Health, Housing Division, London Section, to the effect that the Council's proposal to instal both gas and electricity, and to reduce the allowance for repairs and maintenance from 15 to 12½ p.ct. for six years, is not acceptable. It is pointed out that this proposal is not financially sound; and, apart from this fact, the Ministry do not favour this method of settling the question. Further, that a representative of the Gas Company has been seen, and stated that the Council had already entered into an agreement for the laying of mains and services in the roads where mains did not at present exist; and it has not, therefore, been possible to negotiate for any revision of the terms. But it has been ascertained that the charge of £2 10s. for services (where mains are already in existence) covers the service-pipe from the forecourt fence to the meter, and also from the meter to the cooker point. Similarly, that the charge of £6 5s. (where mains were not already in existence) covers the difference in the cost of mains between pre-war and current cost, and the charge for services as above to the cooker point; and, further, that the cost of services from the main to the forecourt fence, as well as connection to the main, is being borne by the Gas Company free of charge. That the charge for carcassing the houses to lighting-points alone is stated to be £6 5s.; and the charges for connecting cooker and copper 7s. 6d. each (*i.e.*, 15s. per house) are not to be paid by the Council, but are charges directly to the tenant—such charges not ranking for financial assistance. That it was ascertained, furthermore, that if an all-in service be installed—that is, for lighting as well as heating—the charge to the tenant for connecting to cooker and copper will be 5s. per house only. It was suggested that the Council should note these points. The cost for an all-in gas service for the remaining 94 houses which have not already been wired will, therefore, be £12 10s. per house. The Committee have accordingly decided for an all-gas service.

Thorncliffe Coal Distillation Company, Ltd.—The Directors, in their report for the fifteen months ended June 30 last, state that the bye-product plant of the Barnsley Main Colliery Company, Ltd., was acquired as from Jan. 1, 1921; and the purchase price agreed upon has been satisfied by allotment of 89,833 of 8 p.ct. preference shares of £1 each. After allowing for depreciation and making suitable provision for excess-profits duty, income-tax, and corporation profits tax, the profit and loss account shows a profit of £57,404. A dividend is recommended at the rate of 8 p.ct. per annum on 393,338 of 8 p.ct. preference shares for the six months ended June 30, 1921 (less income-tax), writing-off the whole of the formation expenses as well as the costs of conveyance, and carrying forward the balance amounting to £6895.

BOYS CALORIMETER.

Gas Referees Latest Pattern.



COMPLETE
with
HYGROMETER
and
Printed Tables
and Formulæ
for converting
RESULTS OF TESTS
into
TOTAL HEAT
B.Th.Us.

ALEXANDER WRIGHT & CO., LTD.,
WESTMINSTER.

Coal Cheaper at Dundee.

Reporting to the Dundee Gas Committee on the cost of coal supplies, Mr. Alexander Yuill (the Engineer) said that at the beginning of the financial year estimates had been based on an average cost of 45s. 10d. per ton. Up to the end of August, the average cost had been 63s. per ton. Offers had, however, now been received for the supply of the best quality of coal suited for gas manufacture at the rate of 33s. 11·71d. Calculated on the total requirements for the year, at this rate, the average cost for the year came to 41s. 6d.; being 4s. 4d. per ton less than the estimate allowed for. This would result in a saving on the estimates of £20,583. Another advantage the department would gain would come from the coal being eminently suited for the manufacture of gas, and not of the inferior quality which was obtained last year. In support of this statement, he submitted figures showing that 18,931 c.ft. of gas had been extracted from the coal per ton this year, compared with 14,665 c.ft. last year. It was possible a reduction would be made on the cost of transport; and the department would also benefit from this. Treasurer Johnston congratulated the department on the prices arranged. When the gas rate was fixed at 3s. 7d. per 1000 c.ft., there was a fear that the price might have to be increased in November. The Committee would now be enabled to keep it at that level.

English and French Pipe Prices.

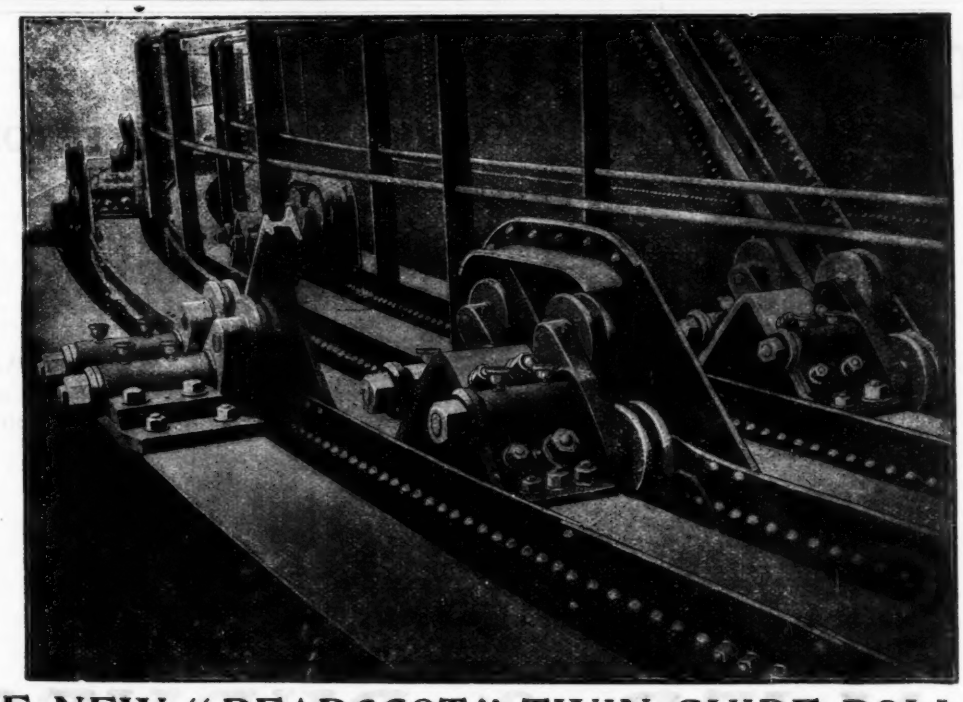
The following remarks with regard to English and French pipe prices are taken from the "Yorkshire Post:" An illuminating sidelight on the pressure of foreign competition in the engineering trade is afforded by the experience of the Leeds Corporation over a contract for cast-iron gas-mains. The manufacture of this product is mainly concentrated in the Midlands; and in quotations for a year's contract to supply the Gas Department of Leeds with street mains, it is found that a French firm are able to beat English competitors by anything from 12 to 25 p.ct., taking one kind of pipe with another. It is another instance of higher cost of production on this side, beginning with raw material, and ending with labour. The Frenchman in this particular case, we are informed, has the advantage in both respects, but chiefly in the amount of output per man. "Until our men," says one authority, "take a leaf out of the foreigner's book, and work while they are at it, there will be little hope of England's keeping even its own market, to say nothing of recapturing lost trade abroad." The question arises whether in this particular case it may not be possible to get something knocked off the English tenders. Like other trades, it is highly organized, and the Gas Committee of Leeds, before sending work abroad, are desirous of finding out whether concessions in the tenders sent in may prove such as to justify paying even a superior figure for the sake of keeping the work in this country, especially as municipalities are spending public money wholesale in relief work, much of which is unremunerative.

Leamington Priors Gas Company.

In the absence through illness of the Chairman (Dr. T. W. Thursfield), the half-yearly meeting of the Company was presided over by Dr. Harold Mason, who, in moving the adoption of the report and accounts, explained that the Company, in common with all others, had been very badly hit by the coal strike. Before it was over, they were faced with the alternatives of arranging for closing-down the works—thus adding to unemployment and causing very great hardship to thousands of gas consumers—or buying Dominion coal at £5 a ton, to make sure of being able to carry on. Either step meant a very serious loss, and a reduction of dividend; and they decided to carry on. It was a healthy sign that, in spite of the coal strike, the sales of gas for both the past six months and twelve months showed increases over the corresponding periods a year ago. The present price of gas —4s. per 1000 c.ft.—would have to go up; but he was convinced that the price of coal would come down, and then the price of gas could be revised again. The existing charge of 4s. was the cheapest in the Midlands. The sulphate of ammonia plant erected last year was now in full work; but owing to the very low price at which sulphate of ammonia was sold, very little profit had been made. If, however, the plant had not been in existence, they would have had to pay for the crude ammoniacal liquor to be taken away. The report and accounts were adopted; and the proceedings concluded with a vote of thanks to the Board, the General Manager (Mr. R. S. Ramsden), the staff, and employees.

Hire-Charges in the Wandsworth Area.—At a public meeting in Mitcham last week, some extravagant statements were made on the subject of the much-discussed gas apparatus hire-charges of the Wandsworth, Wimbledon, and Epsom District Gas Company. Mr. Spence, representing the Totterdown L.C.C. Estates Tenants' Association at Tooting, said gas users on the estate had lately petitioned the London County Council to remove the gas-fittings and replace them with electric light. A suggestion to refuse to pay the extra charges was not favoured; but a resolution was unanimously passed inviting all kindred bodies in the Company's area to take combined action with Mitcham.

Lockjaw from a Gas-Works Accident.—At an inquest on the body of Owen Hughes, 23 years of age, who died at the Llandudno Hospital from lockjaw, it was stated that deceased was employed at the gas-works, and was engaged in filling a purifier when the cover fell and crushed his finger. At the hospital part of the finger was removed. He seemed to do fairly well afterwards as an out-patient; but tetanus developed, which, according to medical evidence, was due to infection at the time of the accident. A verdict was entered that Hughes died from the effects of the accident; and Mr. W. Thomas (the Chairman of the Gas Committee) expressed the sympathy of the Council with the relatives of their employee.



THE NEW "BEARSCOT" TWIN GUIDE ROLLERS

R. & J. DEMPSTER, LTD.,

London Office:
34, VICTORIA STREET,
WESTMINSTER, S.W. 1.

MANCHESTER.

Electric Wires and Gas-Pipes.—The Oldham Corporation Gas Committee have decided to ask the Electricity Committee to issue a warning to local electricians as to the danger of placing electric wires too near gas-pipes. At a meeting of the Gas Committee, a short length of gas service-pipe in which a hole had been fused was produced. It was stated that the pipe had been cut from the bedroom of a house in which electric light had also been installed; and the wire was placed close to the pipe. The fusing caused a leakage, which almost suffocated the occupant of the room.

Gas Favoured in House Assessment.—A remark by the City Assessor at a Glasgow Valuation Court, that he is prepared to assess houses lit by gas at 5 p.ct. less than those lit by electricity, is, it is stated, being much discussed. A householder, writing in the "Glasgow Herald," says it would be interesting to have the Assessor's reason for this attitude, and goes on: "The Corporation advocate the use of electricity on health grounds. They say there are no fumes, dust, dirt, or vitiation of atmosphere. Now the Assessor's proposal is a distinct discouragement to those intending to substitute electricity for gas. The writer had intended doing so; but the Assessor's pronouncement counsels caution. I have no doubt many others are of like mind; and, as a consequence, men who would be employed installing electricity are idle."

Kidderminster Gas Company.—It was impossible for the Directors to recommend a dividend at the recent half-yearly meeting of the Company, as the trading had resulted in a loss of £3455. The Chairman (Mr. G. W. Grosvenor) pointed out, however, that the adverse nature of the balance-sheet was due to no lack of energy on the part of the Directors or the Manager (Mr. Percy Dougall). They had great hope that the cost of manufacture would materially decrease in the immediate future. An Order had been obtained under the Gas Regulation Act. The Directors wished to put on record their high appreciation of the services of the Manager and the staff, in doing their best in the difficult circumstances with which they had had to contend. The General Purposes Committee have accepted the Company's tender for lighting 500 lamps for seven months, at a cost of £3 15s. 10d. per lamp.

Bexhill Water and Gas Company.—At the meeting on Friday last, the Directors submitted the accounts for the half year ended June 30. In their report, they stated that the extraordinary difficulties with which the Company had been faced, in the working of the gas side of the undertaking during the half year, had caused the disappointing results. The accounts showed a balance at the credit of the profit and loss account available for dividend of £3534. They recommended that a dividend be declared for the six months at the rate of 2 p.ct. per annum on the capital authorized by the Acts of 1885 and 1892, and at the rate of £1 8s. p.ct. per annum on the capital authorised by the Act of 1896, Order of 1901, and Act of 1904, and at the rate of 5 p.ct. per annum on the preference share capital, less income-tax. This, with provision for income-tax, absorbed £1765, leaving £1769 to be carried forward to next account.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Sept. 28.]

Nos. 24,742 to 25,402.

Aldridge, J. G. W.—"Apparatus for charging, &c., gas-retorts." No. 25,182.

Apthorpe, W. H.—"Flow indicators." No. 25,390.

Bicknell, R. H.—"Pipe-joints." No. 25,347.

Bienz, C.—"Obturators for gas-engines." No. 24 822.

Cambridge & Paul Instrument Company, Ltd.—See Apthorpe. No. 25,390.

Cossom, W. V.—"Apparatus for preventing waste of fluids from pipes, &c." No. 25,149.

Crockett, H.—"Taps or valves." No. 25,396.

Deeley, J. C.—"Apparatus for gasification of coal." No. 24,870.

Dickinson, F. J.—"Geysers." No 24,790.

Fall, T. A.—"Taps and valves." No. 25,126.

Ferguson, D.—"Gas-savers." No. 24,896.

Gillespie, R. F.—"Cocks or valves." No. 25,367.

Heathcote, W.—"Gas-cooker." No. 25,212.

Hodgson, F.—"Fuel-economizers for gas-stoves, &c." No. 24,858.

Kearton, W. J.—"Centrifugal gas-compressors." No. 24,750.

Laing, B.—"Distillation of carbonaceous materials." No. 24,945.

Lodge Fume Company, Ltd.—"Insulator for electrodes of electrical gas purifiers." No. 25,247.

Lodge Fume Company, Ltd.—"Process for electrical gas purification." No. 25,248.

Metallbank und Metallurgische Ges.—See Lodge Fume Company. Nos. 25,247, 25,248.

Nielsen, H.—See Laing. No. 24,945.

Pearson, Ltd., E. J. & J.—See Deeley. No. 24,870.

Powers, H.—"Gas-producers." No. 25,352.

Redwood, J. H.—"Method of securing diaphragms, &c., to dry gas-meters." No. 24,751.

Snell, C. Scott.—"Incandescent gas-burners." No. 24,862.

Umpleby, F.—"Gas-producers." No. 25,352.

Weller, F. W.—"Apparatus for regulating the flow of gases." No. 24,811.

Whiteley, T.—"Gas-cooking ovens." No. 25,205.

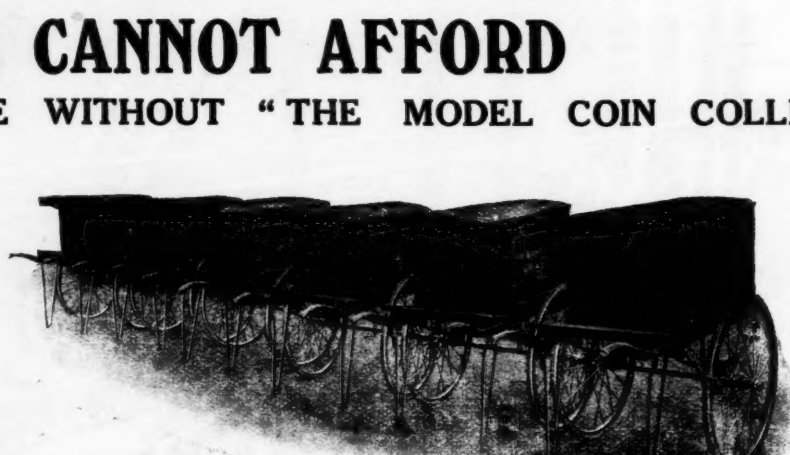
Wingfield, B. R.—"Automatic temperature regulators." No. 25,134.

A verdict of "Suicide while of unsound mind" was returned at an inquest held at Bradford on the body of Clara Cooper, who was found dead in bed with one end of a gas-tube in her mouth, and the other end connected with the gas-bracket.

YOU CANNOT AFFORD

TO BE WITHOUT "THE MODEL COIN COLLECTOR"

Delivery from Stock



Prices on Application

PART OF ORDER RECEIVED FROM Messrs. SOUTH METROPOLITAN GAS Co.

SAWER & PURVES

BRANCH of METERS LTD.

NELSON METER WORKS
MANCHESTER

RADFORD METER WORKS
NOTTINGHAM

South Australian Gas Company.—The sixteenth annual report of the Company (who supply Adelaide with gas) states that the accounts for the year ended June 30 show a profit of £61,716; and after payment of the usual dividend, there is a balance to carry forward of £2546. The income from sales of gas, residuals, &c. (less bad debts), amounted for the twelve months to £411,589.

Further Gas Plant for Rhyl.—A Ministry of Health inquiry has been held by Mr. C. H. Roberts at Rhyl, regarding an application by the Urban District Council for sanction to borrow £10,500 for the gas undertaking. It was stated that, with the growing popularity of the town, the present works and plant had become inadequate. The Council had been considering the reconstruction of the whole undertaking on a more convenient site; but in view of the outlay this would entail, they were content for the present to secure the minimum additional plant necessary at the existing works. The proposed new apparatus included a carburetted hydrogen plant.

Price of Gas at Malton.—With reference to a proposed increase in the price of gas by 6d. per 1000 c.ft. at Malton, Mr. Hugh W. Pearson (Chairman of the Company) states that there was a loss on the half-year's working of £300; whereas the Company in normal times made a profit of £1300 or £1400 in the six months. The price of coal had not materially gone down, as during the war the Company paid as high as £4 10s. per ton for rubbishy coal from which no residuals could be obtained. The increase ought to have been made long ago. Even when it became operative on Oct. 1 the charge of 4s. 6d. per 1000 c.ft. would compare favourably with other towns. At the monthly meeting of the Norton (Malton) Urban Council, Mr. John Hollings raised the question of the increase, and said he considered it an imposition, as wages had gone down and coal was cheaper. He thought the Council should protest. The Chairman said that, as the Council's contract had not been interfered with, they had really nothing to do with it.

STOCK MARKET REPORT.

THE state of things on the Stock Exchange underwent no change last week. There was the same reduced scale of business and the same general dullness which brooded over pretty well all markets, with but rare exceptions here and there. But the position began to look a shade more promising before the close.

The gilt-edged division came out fairly well, and Home Government issues (except Funding) were firm; the Friday figures for the big four being: Consols 48½-48¾, War Loan 88 9/16-89, Funding 71½-71⅝, Victory 75⅞-76. Bonds also did well. Home Rails were very flat until Friday, when they steadied a bit. Canadians were easier, and Argentines very weak.

The Foreign Market was very variable, the tide changing almost from day to day; but Brazilian and Chinese did fairly well. The Miscellaneous Market generally was weak; but Rubbers somewhat amended their position.

Business in the Gas Market was almost the counterpart of the previous week's history, both in quantity and in quality. Transactions were mainly restricted to a couple of companies, and the general tendency was quite favourable. The London Companies were steady, and made no change in quotation. The same may be said of the Suburban and Provincial group. In the Continentals, Imperial (which will pay a 3 p.ct. interim dividend) was firm. In Foreign, Primitiva was cheered by the Directors' issued statement of profits earned in the last half year, and some of the debenture issues advanced their quotations a point.

Bargains done for cash during the week were as follows: On Monday, Bombay 3, Brentford "A" 69½, Brighton and Hove ordinary 79, Commercial 3¼ p.ct. 53, European 7 9/16, 7½, Gas Light ordinary 59⅜, 60, 60½, 60⅓, ditto debenture 51½, Imperial Continental 126, Primitiva 14s. 6d., ditto preference 40s., 40s. 3d., South Metropolitan 6½ p.ct. debenture £57 paid 60½, 61, ditto fully-paid 101-101⅜, Cardiff 7½ p.ct. debenture 100½, 100¾. On Tuesday, Commercial 4 p.ct. 56½, European 7, Gas Light ordinary 59½, 59⅞, 60, 60¼, ditto maximum 45½, 45⅝, ditto debenture 51½, 51⅝, Primitiva 15s. 9d., ditto preference 39s., 40s., 40s. 3d., 40s. 7½d., 40s. 9d., River Plate debenture 41, South Metropolitan 70, 70¼, 70⅜, ditto 6½ p.ct. debenture £57 paid 60½-60⅝, ditto fully-paid 101½, South Suburban 68½. On Wednesday, Alliance and Dublin 52, Bombay 3, Brentford "A" 69½, ditto "B" 63½, Brighton and Hove original 111, 112, Commercial 4 p.ct. 55, Gas Light ordinary 59½, 59⅝, 60½, 60⅝, Imperial Continental 126, Monte Video 55, Oriental 90, Primitiva 14s. 6d., 15s., 15s. 6d., 15s. 9d., 16s., ditto preference 40s., 40s. 3d., 40s. 9d., 41s., South Metropolitan 6½ p.ct. debenture £57 paid 60⅜-61, ditto fully-paid 100⅝-101⅜, British (Hull) 3½ p.ct. debenture 47½. On Thursday, Brentford "A" 69⅜, ditto "B" 64, European 7 9/16, Gas Light ordinary 59½, 60, 60⅛, Imperial Continental 125, 126, 126½, 127½, Primitiva 15s., 15s. 6d., ditto preference 40s. 3d., 41s., South Metropolitan 70, 70½, 70⅜, ditto 6½ p.ct. debenture £57 paid 60⅝, ditto fully-paid 100⅝-101½, Brighton and Hove 6 p.ct. "B" preference 88½, 89. On Friday, European 7, Gas Light ordinary 59½, 59⅝, 59⅞, 60, ditto debenture 51½, 51⅝, Imperial Continental 125½, 126, 127, Primitiva 14s. 6d., ditto preference 40s. 7½d., South Metropolitan 6½ p.ct. debenture £57 paid 60½-60⅞, ditto fully-paid 100⅝-101½, Tottenham "B" 53½, 54.

In the Money Market, there was a marked recrudescence of firmness which gathered strength as the quarter's close approached. Discount rates had a sharp rise. Silver was in great demand. The Bank rate is 5½ p.ct., as fixed on July 12.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
£			p.c.					
182,049	Stk.	Aug. 26	4	4%	Aldershot 4 p.c. Pref.	...	50—55	...
1,551,868	,,	Apl. 14	2½	3 1/13%	Alliance & Dublin Ord.	59—64	45—48	52
374,000	,,	July 14	4	4%	Do. 4 p.c. Deb.	76—79	46—51	...
180,000	5	Aug. 11	7½	4/-	Bombay, Ltd.	5½—6½	3—3½	3
100,000	5	,,	16	4/7½	Bournemouth Gas and Water { 5 p.c. ; B 7 p.c. ; Pref. 6 p.c. ; 4 p.c. Deb.	...	7½—8½	...
383,110	10	,,	7	7/-		15—15½	8½—9¼	...
115,000	10	,,	6	6/-		13½—14	7½—8½	...
162,065	—	June 30	—	4%		...	54—59	...
992,045	Stk.	July 15	14	56/-	Brentford A Consolid.	261—266	67—70	69½
734,920	,,	,,	11	55/-	Do. B New	204—209	62—65	63½—64
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	68—72	...
221,400	,,	June 13	4	4%	Do. 4 p.c. Deb.	91—95	57—59	...
214,775	,,	Aug. 26	11	10 4/9%	Brighton & Hove Orig.	208—213	110—115	111—112
244,200	,,	,,	8	7 2/9%	Do. A Ord. Stk.	154—159	77—82	79
1,287,500	Stk.	July 28	5	5%	Bristol 5 p.c. max.	...	...	...
530,000	20	Sept. 29	12½	10%	British	44—45	21—23*	...
120,000	Stk.	June 30	4	4%	Do. 4 p.c. Deb. Stk.	88—90	55—58	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	40—43	...
100,000	10	May 27	—	6%	Cape Town & Dis., Ltd.	1½—2½	6½—7½	...
100,000	10	Apl. 28	—	4½%	Do. 4½ p.c. Pref.	4—6	4½—5½	...
100,000	Stk.	June 30	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	53—58	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	...	...
1,513,280	,,	July 28	5/9/4	42/8	Commercial 4 p.c. Stk.	106—108	54—57	55—56½
560,000	,,	,,	5½	38/4	Do. 3½ p.c. do.	103—105	52—55	53
475,000	,,	June 13	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	44—47	...
800,000	,,	Dec. 11	4	—	Continental Union Ltd.	76—79	18—20	...
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	30—35	...
31,600	,,	Aug. 26	15	15%	Croydon A 10 p.c.	...	150—155	...
278,400	—	,,	12	12%	Croydon B and C 7 p.c.	...	120—125	...
492,270	Stk.	—	6	4½%	Derby Con. Stk.	125—135	...	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	...	...
1,002,180	10	Jan. 29	10	5/0	European, Ltd.	17½—18	7—7½	7—7½
16,298,975	Stk.	Aug. 11	1/17/4	46/8	Gas { 4 p.c. Ord. ; 3½ p.c. max.	98—102	59—61	59½—60½
2,600,000	,,	,,	3½	35/-		76—79	44—46	45½—45¾
4,062,235	,,	,,	4	4%	Light and Coke { 4 p.c. Con. Pref. ; 5 p.c. Con. Deb. ; 10 p.c. Bonds.	96—99	58—60	...
4,674,850	,,	June 15	5	5%		72½—74½	30—52	51½—51⅝
130,000	,,	Dec. 11	10	10%		...	...	...
82,500	,,	Sept. 14	5	3 1/3%	Hastings & St. L. 5 p.c.	...	48—50	...
258,740	,,	,,	3½	2 6/9%	Do. 3½ p.c.	87—89	34—36	...
70,000	10	May 12	11	5%	Hongkong & China, Ltd.	16½—16¾	5—6	...
86,600	Stk.	Aug. 26	9	9 1/6%	Hornsey 7 p.c.	...	78—83	...
131,000	,,	July 28	7½	7 1/2%	Ilford A and C	151—154	78—80	...
63,780	,,	,,	6½	5 1/2%	Do. B	115—118	57—59	...
63,500	,,	June 30	4	4%	Do. 4 p.c. Deb.	92—94	54—56	...
1,976,000	,,	May 27	9	5%	Imperial Continental	150—160	125—130	125—127½
1,235,000	,,	Aug. 11	3½	3 1/2%	Do. 3½ p.c. Deb. Red.	84—86	79—81	...
235,242	,,	Mar. 30	6½	3 1/2%	Lea Bridge Ord. 5 p.c.	110—121	68—70	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. { A. ; B.	211—213	...	...
						146—148	...	...
306,085	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	...	...	...
165,736	,,	Aug. 11	7/5/6	6%	Maidstone 5 p.c.	...	54—56	...
63,480	,,	Dec. 30	—	3%	Do. 3 p.c. Deb.	...	40—43	...
75,000	5	June 11	6	5%	Malta & Mediterranean	4½—4¾	1½—2½	...
250,000	100	Apl. 1	4½	4 1/2%	Met. of Melbourne 4½ p.c. Deb.	99—101	90—98	...
541,920	Stk.	May 27	4	6%	Monte Video, Ltd.	11½—12	55—60	55
1,875,892	,,	July 28	4½	3%	Newcastle & Gatsh'd Con.	98½—99½	57½—58½	...
529,705	,,	June 30	3½	3 1/2%	Do. 3½ p.c. Deb.	82—85	48—50½	...
115,000	10	Aug. 26	—	7/6	North Middlesex 10 p.c.	...	12½—13½	...
55,940	10	,,	7/14/0	5/3	,, ,, 7 p.c.	14—15	7½—8	...
300,000	Stk.	May 12	8	8%	Oriental, Ltd.	117—122	88—93	90
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	2—3	...
188,120	Stk.	June 30	—	3 1/2%	Plym'th & Stonch'se 5 p.c.	...	64—67	...
60,000	50	Aug. 26	15	60/-	Portsea Island, B	128—131	64—67	...
100,000	50	,,	12	55/-	Do. C	118—121	51—54	...
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	1½—2⅛	14/6—16/-
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4½—5	1½—2½	39/—41/-
521,600	100	June 1	4	4%	Do. 4 p.c. Deb.	91—95	65—67	...
600,000	Stk.	July 28	4	4%	Do. ,, ,, 1911	...	40—43	...
546,198	,,	June 30	4	4%	River Plate 4 p.c. Deb.	85—87	40—43	41
150,000	10	Sept. 29	6	6/-	San Paulo { 6 p.c. Pref. ; 5 p.c. Deb.	10½—11	6—6½*	...
125,000	50	June 30	5	5%		47—49	35—38	...
135,000	Stk.	Aug. 26	10	5%	Sheffield A	223—224	61—62	...
209,984	,,	,,	10	5%	Do. B	228—224	60—62	...
523,500	,,	,,	10	4½%	Do. C	220—222	59—61	...
153,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	...	...	...
90,000	10	June 30	9	8%	South African	10½—11½	7—9	...
6,609,895	Stk.	July 28	5/4/0	5%	South Met. Ord.	111—113	69—71	70—70½
250,000	,,	July 14	—	5%	Do. Red. Pref.	...	93—95	...
1,895,445	,,	,,	5	5%	Do. 5 p.c. Deb.	72½—74½	48—50	...
224,820	,,	Feb. 25	8½	7½%	South Shields Con. Stk.	157—159	*85—87	...
1,087,795	,,	Aug. 11	6	5 5/9%	S'th Suburb'n Ord. 5 p.c.	114—116	67—69	68½
368,837	,,	June 30	5	5%	Do. 5 p.c. Deb. Stk.	116—118	73—76	...
647,740	,,	May 12	7½	5 2/9%	Southampton Ord.	99—102	55—58	...
121,275	,,	June 30	4	4%	Do. 4 p.c. Deb. Stk.	...	59—61	...
120,000	,,	Aug. 11	—	6%	Tottenham { A 5 p.c. ; B 3½ p.c. ; 4 p.c. Deb.	135—138	62—64	...
782,275	,,	,,	6	4 2/9%		115—117	52—54	53½—54
181,255	,,	June 15	4	4%		87—89	54—57	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Aug. 26	5	3 1/2%	Tynemouth 5 p.c. max.	108½—109	66½—68½	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Aug. 11	8½	66/3	Wandsworth A 5 p.c.	151—156	78—80	...
255,636	,,	,,	6½	51/3	Do. B 3½ p.c.	129—134	57—59	...
108,075	,,	,,	—	46/4½	Do. C	...	55—57	...
140,865	,,	,,	—	46/4½	New Ordinary	...	57—59	...
352,000	,,	,,	6½	45/-	Wimbledon 5 p.c.	117—122	53—55	...
98,000	,,	,,	6½	50/-	Epsom 5 p.c.	122—126	56—58	...
88,416	,,	June 30	3	3%	3 p.c. Deb. Stk.	66—69	44—47	...

* Ex Div.

Gas Price at Llandudno.—The Llandudno Urban District Council have increased the price of gas to ordinary consumers from 6s. to 6s. 6d. per 1000 c.ft.; but for the prompt payment of accounts they will allow a discount of 7½ p.ct., instead of 5 p.ct. as at present. The price to slot-meter consumers continues at 6s.; but the discount will equalize the net cost to both classes of users. The new price is the maximum allowed under the Council's powers; and it must be charged before any costs of the undertaking can be put on the rates. Some charge upon the ratepayers will be required, as the Council have just spent £50,000 on new plant, and there is a deficit of £21,000 to be made up. Of this £10,000 was due to the coal stoppage, and £6000 for the new carburetted hydrogen plant.

Attention has been directed by Messrs. Firth Blakeley, Sons, & Co., Ltd., of Church Fenton, to a pamphlet illustrating contracts that have been recently carried out by them, in connection with tanks, towers, and other constructional work. It indicates the varied character of the firm's activities.

The Greasborough Urban Council have authorized the Clerk to make inquiries as to the cost of extending the gas-mains of the Rotherham Corporation from Greasborough to Nether Haugh, a distance of about a mile. The work would provide opportunities for relieving unemployment.

In order to prevent the dismissal of lamplighters, the St. Pancras Borough Council have decided not for the time being to proceed further with the conversion of lamps for automatic lighting.

A disastrous fire last Saturday morning almost completely destroyed the incandescent gas mantle factory on the Quai Jemmapes, at Paris. The extent of the damage done was estimated to be about £20,000.

The Chesterfield Corporation General Purposes Committee have asked the Gas and Water Committee to make provision for the insertion in the next Parliamentary Bill to be promoted by the Council of a flat-rate to consumers.

The Smethwick Town Council have resolved to make arrangements for borrowing £37,907 to cover the aggregate amount of the tenders in connection with the re-organization of the vertical retorts and coal-handling plant at the gas-works.

All about "Pinnacle" steels for tools is to be found in the catalogue of Messrs. R. B. Hodgson & Co., Ltd., of the Sentinel Steel Works, Sheffield. There are distinct grades and qualities of steels to meet the individual requirements of special tools and particular classes of work; and there are discussed the determining factors in the selection of tool steel. But the strictly "catalogue" portion is not all that is to be found in the book; for a large portion of the contents is found to consist of useful, practical information for tool users, under the heading of "Heat Treatment of 'Pinnacle' High-Speed Steels."

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON TUESDAY, to ensure insertion in the following day's issue.

Orders to Alter or Stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Monday.

UNDISPLAYED ADVERTISEMENTS: Situations Wanted, Six Lines and under (about 36 words) 3s.; each additional Line, 6d. Situations Vacant, Apparatus Wanted and for Sale, Contracts, Public Notices, &c., 9d. per Line—minimum, 4s. 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

		ONE YEAR.	HALF-YEAR.	QUARTER.
United Kingdom	Advance Rate:	35/-	18/-	10/-
	Credit Rate:	40/-	21/-	11/6
Abroad (in the Postal Union) Payable in Advance		40/-	22/6	12/6

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON

FOR SALE OUTRIGHT, OR ON LOAN.

SPENT OXIDE

PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LTD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.2.

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for Gas-Works.
ANDREW STEPHENSON, Gresham House, Old Broad Street, LONDON, E.C. "Volcanism, London."

BRITISH LUX.
AN EXCELLENT PURIFYING MATERIAL.
Features;—
(a) Porosity equal to Best Bog Ore.
(b) Contains Ferric Hydrate in an active state, thus resembling "Lux."
(c) Prepared in good mechanical condition ready for Purifiers.
DANIEL MACVIE, 1, NORTH ST. ANDREW STREET, EDINBURGH.

WE are Buyers of Crude Gas-Works COAL TAR. If you have any for DISPOSAL kindly communicate with
CONSTABLE, HART, AND CO., LTD.,
TAR MACADAM MANUFACTURERS,
MATLOCK.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR (SATURATORS), LTD., Chemical Plant Engineers, Blackhorse Street Mills, BOLTON.
Telegrams—"SATURATORS, BOLTON." Telephone 848.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—
"BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

HIGH-PRESSURE DISTRIBUTION.
COMPLETE Tables for Flow of Gas in Mains, at all Pressures from ¼ inch to 100 lbs.
Many other useful PRESSURE TABLES.
See "DISTRIBUTION BY STEEL" (Woodall and Parkinson), SECOND EDITION 15s. 9d., Post Free, BENN BROS., LTD., 8, Bouverie Street, LONDON, E.C.4.

SULPHURIC ACID.
SPECIALLY prepared for the manu- facture of SULPHATE OF AMMONIA.
SPENSER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD., Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN, LONDON."
Telephone—1588 AVENUE (3 lines).

BRITISH GAS PURIFYING MATERIAL.
ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON,
SPENT OXIDE BOUGHT.
BRITISH GAS PURIFYING MATERIALS CO., LTD.
ARCADIAN GARDENS, WOOD GREEN, LONDON, N. 22.
Telegrams: "Bripurimat, Wood, London."
'Phone: Palmers Green 608.

OXIDE OF IRON.
SPENT OXIDE BOUGHT.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C.3.
Phone: Minories 1484.

"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C.3.
Phone: Minories 1484.

"KLEENOFF," THE COOKER CLEANSER.
Tins for Sale to Consumers.
In Bulk for Works Use.
BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C.3.
Phone: Minories 1484.

TAR WANTED.
BEFORE entering into any arrangement for the DISPOSAL of your Production it will be to your interest to communicate with
BROWNHILLS CHEMICAL WORKS CO.,
near WALSALL.

J. E. C. LORD (Manchester), Ltd., Ship Canal Tar Works, Weaste, Manchester.
Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

SPENCER'S Patent Inclined HURDLE GRIDS.
THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Aug. 31, p. 508